No. 200200049

THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Kansas Agricultural Experiment Station

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED DISTINCT VARIETY OF SEXUALLY REPRODUCED, OR TUBER PROPAGATED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF TWENTY YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR IMPORTING IT, OR EXPORTING IT, OR CONDITIONING IT FOR PROPAGATION, OR STOCKING IT FOR ANY OF THE ABOVE PURPOSE , OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT. IN THE UNITED STATES SEED OF THIS VARIETY (1) SHALL BE SOLD BY VARIETY NAME ONLY AS A CLASS OF CERTIFIED SEED AND (2) SHALL CONFORM TO THE NUMBER OF GENERATIONS SPECIFIED BY THE OWNER OF ITS. (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

WHEAT, COMMON

'Lakin'

In Testimony Whereof, I have hereunto set my hand and caused the seal of the Plant Variety Protection Office to be affixed at the City of Washington, D.C. this thirteenth day of November, in the year two thousand two.

Attest:

Acting Commissioner
Plant Variety Protection Office
Agricultural Marketing Service

Secretary of Agriculture

REPRODUCE LOCALLY. *Include form number and date on all reproductions*

Form Approved - OMB No. 0581-0055

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
SCIENCE AND TECHNOLOGY - PLANT VARIETY PROTECTION OFFICE

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

(Instructions and information collection burden statement on reverse)

The following statements are made in accordance with the Privacy Act of 1974 (5 U.S.C. 552a) and the Paperwork Reduction Act (PRA) of 1995.

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

1. NAME OF OWNER
Kansas Agricultural Experiment Station

2. TEMPORARY DESIGNATION OR EXPERIMENTAL NAME
KS96HW115

3. VARIETY NAME
Lakin

4. ADDRESS *(Street and No., or R.F.D. No., City, State, and ZIP Code, and Country)*
Waters Hall
Kansas State University
Manhattan KS 66506

5. TELEPHONE *(Include area code)*
785-532-6147

6. FAX *(Include area code)*
785-532-6563

FOR OFFICIAL USE ONLY

PVPO NUMBER
200200049

FILING DATE
12/14/01

7. IF THE OWNER NAMED IS NOT A "PERSON", GIVE FORM OF ORGANIZATION *(corporation, partnership, association, etc.)*
University

8. IF INCORPORATED, GIVE STATE OF INCORPORATION

9. DATE OF INCORPORATION

10. NAME AND ADDRESS OF OWNER REPRESENTATIVE(S) TO SERVE IN THIS APPLICATION. *(First person listed will receive all papers)*
T. Joe Martin
Kansas State University
Agricultural Research Center—Hays
1232 240th Avenue
Hays, KS 67601

FEES RECEIVED

FILING AND EXAMINATION FEES:
$ 2705.00
DATE 12/14/2001

CERTIFICATION FEE:
$ 320.00
DATE 3/8/02

11. TELEPHONE *(Include area code)*
785-625-3425

12. FAX *(Include area code)*
785-623-4369

13. E-MAIL
jmartin@oznet.ksu.edu

14. CROP KIND *(Common Name)*
wheat

15. GENUS AND SPECIES NAME OF CROP
Triticum aestivum

16. FAMILY NAME *(Botanical)*
Gramineae

17. IS THE VARIETY A FIRST GENERATION HYBRID?
☐ YES ☒ NO

18. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED (Follow instructions on reverse)
- a. ☒ Exhibit A. Origin and Breeding History of the Variety
- b. ☒ Exhibit B. Statement of Distinctness
- c. ☒ Exhibit C. Objective Description of Variety
- d. ☒ Exhibit D. Additional Description of the Variety *(Optional)*
- e. ☒ Exhibit E. Statement of the Basis of the Owner's Ownership
- f. ☒ Voucher Sample *(2,500 viable untreated seeds or, for tuber propagated varieties, verification that tissue culture will be deposited and maintained in an approved public repository)*
- g. ☒ Filing and Examination Fee ($2,705), made payable to "Treasurer of the United States" *(Mail to the Plant Variety Protection Office)*

19. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE SOLD AS A CLASS OF CERTIFIED SEED? *See Section 83(a) of the Plant Variety Protection Act)*
☒ YES *(If "yes", answer items 20 and 21 below)* ☐ NO *(If "no", go to item 22)*

20. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF CLASSES? ☒ YES ☐ NO
IF YES, WHICH CLASSES? ☒ FOUNDATION ☒ REGISTERED ☒ CERTIFIED

21. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS? ☒ YES ☐ NO
IF YES, SPECIFY THE NUMBER 1,2,3, *etc.* [1] FOUNDATION [1] REGISTERED [1] CERTIFIED
JPM 11-23-01
(If additional explanation is necessary, please use the space indicated on the reverse.)

22. HAS THE VARIETY (INCLUDING ANY HARVESTED MATERIAL) OR A HYBRID PRODUCED FROM THIS VARIETY BEEN SOLD, DISPOSED OF, TRANSFERRED, OR USED IN THE U. S. OR OTHER COUNTRIES?
☒ YES ☐ NO
IF YES, YOU MUST PROVIDE THE DATE OF FIRST SALE, DISPOSITION, TRANSFER, OR USE FOR EACH COUNTRY AND THE CIRCUMSTANCES. *(Please use space indicated on reverse.)*

23. IS THE VARIETY OR ANY COMPONENT OF THE VARIETY PROTECTED BY INTELLECTUAL PROPERTY RIGHT *(PLANT BREEDER'S RIGHT OR PATENT)*?
☐ YES ☒ NO
IF YES, PLEASE GIVE COUNTRY, DATE OF FILING OR ISSUANCE AND ASSIGNED REFERENCE NUMBER. *(Please use space indicated on reverse.)*

24. The owners declare that a viable sample of basic seed of the variety will be furnished with application and will be replenished upon request in accordance with such regulations as may be applicable, or for a tuber propagated variety a tissue culture will be deposited in a public repository and maintained for the duration of the certificate.

The undersigned owner(s) is(are) the owner of this sexually reproduced or tuber propagated plant variety, and believe(s) that the variety is new, distinct, uniform, and stable as required in Section 42, and is entitled to protection under the provisions of Section 42 of the Plant Variety Protection Act.

Owner(s) is(are) informed that false representation herein can jeopardize protection and result in penalties.

SIGNATURE OF OWNER	SIGNATURE OF OWNER
NAME *(Please print or type)* Forrest Chumley	NAME *(Please print or type)*
TITLE ciate Director search	DATE 12-5-01
CAPACITY OR TITLE	DATE

Designed by the Plant Variety Protection Office with WordPerfect 6.0a. Replaces STD-470 (02-99) which is obsolete. *(See reverse for instructions and information collection burden statement)*

INSTRUCTIONS

2002000497

GENERAL: To be effectively filed with the Plant Variety Protection Office (PVPO), **ALL** of the following items must be **received** in the PVPO: (1) Completed application form signed by the owner; (2) completed exhibits A, B, C, E; (3) for a seed reproduced variety at least 2,500 viable untreated seeds, for a hybrid variety at least 2,500 untreated seeds of each line necessary to **reproduce** the variety, or for tuber reproduced varieties verification that a viable *(in the sense that it will reproduce an entire plant)* tissue culture will be deposited and maintained in an approved public repository; (4) check drawn on a U.S. bank for $2,705 ($320 filing fee and $2,385 examination fee), payable to "Treasurer of the United States" *(See Section 97.6 of the Regulations and Rules of Practice.)* Partial applications will be held in the PVPO for not more than 90 days, then returned to the applicant as unfiled. Mail application and other requirements to Plant Variety Protection Office, AMS, USDA, Room 500, NAL Building, 10301 Baltimore Avenue, Beltsville, MD 20705-2351. Retain one copy for your files. All items on the face of the application are self explanatory unless noted below. Corrections on the application form and exhibits must be initialed and dated. **DO NOT** use masking materials to make corrections. If a certificate is allowed, you will be requested to send a check payable to "Treasurer of the United States" in the amount of $320 for issuance of the certificate. Certificates will be issued to owner, not licensee or agent.

Plant Variety Protection Office
Telephone: (301) 504-5518
FAX: (301) 504-5291
Homepage: http://www.ams.usda.gov/science/pvpo/pvp.htm

ITEM

18a. Give: (1) the genealogy, including public and commercial varieties, lines, or clones used, and the breeding method;
(2) the details of subsequent stages of selection and multiplication;
(3) evidence of uniformity and stability; and
(4) the type and frequency of variants during reproduction and multiplication and state how these variants may be identified

18b. Give a summary of the variety's distinctness. Clearly state how this application variety may be distinguished from all other varieties in the same crop. If the new variety is most similar to one variety or a group of related varieties:

(1) identify these varieties and state all differences objectively;
(2) attach statistical data for characters expressed numerically and demonstrate that these are clear differences; and
(3) submit, if helpful, seed and plant specimens or photographs (prints) of seed and plant comparisons which clearly indicate distinctness.

18c. Exhibit C forms are available from the PVPO Office for most crops; specify crop kind. Fill in Exhibit C (Objective Description of Variety) form as completely as possible to describe your variety.

18d. Optional additional characteristics and/or photographs. Describe any additional characteristics that cannot be accurately conveyed in Exhibit C. Use comparative varieties as is necessary to reveal more accurately the characteristics that are difficult to describe, such as plant habit, plant color, disease resistance, *etc.*

18e. Section 52(5) of the Act requires applicants to furnish a statement of the basis of the applicant's ownership. An Exhibit E form is available from the PVPO.

19. If "Yes" is specified *(seed of this variety be sold by variety name only, as a class of certified seed)*, the applicant **MAY NOT** reverse this affirmative decision after the variety has been sold and so labeled, the decision published, or the certificate issued. However, if "No" has been specified, the applicant may change the choice. *(See Regulations and Rules of Practice, Section 97.103).*

22. *See Sections 41, 42, and 43 of the Act and Section 97.5 of the regulations for eligibility requirements.*

23. *See Section 55 of the Act for instructions on claiming the benefit of an earlier filing date.*

21. CONTINUED FROM FRONT *(Please provide a statement as to the limitation and sequence of generations that may be certified.)*

22. CONTINUED FROM FRONT *(Please provide the date of first sale, disposition, transfer, or use for each country and the circumstances, if the variety (including any harvested material) or a hybrid produced from this variety has been sold, disposed of, transferred, or used in the U.S. or other countries.)*

Fall, 2001 sold seed in U.S.

23. CONTINUED FROM FRONT *(Please give the country, date of filing or issuance, and assigned reference number, if the variety or any component of the variety is protected by intellectual property right (Plant Breeder's Right or Patent).)*

NOTES: It is the responsibility of the applicant/owner to keep the PVPO informed of any changes of address or change of ownership or assignment or owner's representative during the life of the application/certificate. There is no charge for filing a change of address. The fee for filing a change of ownership or assignment or any modification of owner's name is specified in Section 97.175 of the regulations. *(See Section 101 of the Act, and Sections 97.130, 97.131, 97.175(h) of the Regulations and Rules of Practice.)*

To avoid conflict with other variety names in use, the applicant must check the appropriate recognized authority. For example, for agricultural and vegetable crops, contact: Seed Branch, AMS, USDA, Room 213, Building 306, Beltsville Agricultural Research Center–East, Beltsville, MD 20705. Telephone: (301) 504-8089. http://www.ams.usda.gov/lsg/seed/ls-sd.htm

S&T-470 (04-01) designed by the Plant Variety Protection Office with WordPerfect 6.0a. Replaces STD-470 (02-99) which is obsolete.

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Lakin, PVP Application (Revised)
Exhibit A: Origin and Breeding History of the Variety

Lakin was selected from the cross Arlin/KS89H130.

Parents:
Arlin = Kansas developed hard white winter wheat.
KS89H130 = a hard red winter experimental line selected from a random mating population after two cycles of recurrent selection for reduced wheat streak mosaic virus titer. The following F_1s or lines were inter-mated at random to produce the population from which KS89H130 was selected.

1. Hawk/4/PI194358/2*Larned/Eagle//Sage/3/Larned/Trison (F_1 from last cross)
2. Tut/4/ PI195713/2*Larned/Eagle//Sage/3/Larned/Trison (F_1 from last cross)
3. TAM 105/3/PI195713/2*Larned/Eagle//Sage (F_1 from last cross)
4. TAM 105/3/PI194358/2*Larned/Eagle//Sage (F_1 from last cross)
5. TAM 105/4/ PI194358/2*Larned/Eagle//Sage/3/Larned/Trison (F_1 from last cross)
6. TAM 105/4/PI194358/3/Larned/ Eagle//Sage/4/PI195713/2*Larned /Eagle//Sage (F_1 from last cross)
7. TAM 105/Wings (F_1 from last cross)
8. Arkan/Wings (F_1 from last cross)
9. Arkan/4/PI195713/2*Larned/Eagle//Sage/3/Larned/Trison (F_1 from last cross)
10 Arkan/4/PI194358/2*Larned/Eagle//Sage/3/Larned/Trison (F_1 from last cross)
11 PI194358/2*Larned/Eagle//Sage/3/Arkan (F_1 from last cross)
12 PI194358/2*Larned/Eagle//Sage/3/TAM 105//Payne/Amigo (F_1 from last cross)
13 PI194358/2*Larned/Eagle//Sage/3/ND7637 (F_1 from last cross)
14 PI194358/2*Larned/Eagle//Sage/3/ND7637/TX73V169 (TAM 101/Centurk) (F_1 from last cross)
15 PI194358/2*Larned/Eagle//Sage/3/ND7637/TX73V169 (F_1 from last cross)
16 PI194358/2*Larned/Eagle//Sage/3/TAM 105//Larned/Trison (F_1 from last cross)
17 PI195713/2*Larned/Eagle//Sage/3/Larned/Trison (KS80HA845)
18 Newton sib (KS75210)

1991: F_1 was grown in the greenhouse at Hays, KS, seeds from all F_1 plants were bulked at harvest. Segregation was not noted among the F_1 plants.

1992: F_2 grown in the field at Hays, KS and bulked at harvest. The population segregated for height, maturity and leaf rust resistance. Seed harvested segregated for seed color and the white seed were select for planting of the F_3. The only other selection criteria used on the populations was the presence of leaf rust resistance.

1993: F_3 grown in the field at Hays, KS and single heads were selected at harvest. The population segregated for the same characters as in the F_2 except there was no segregation for seed color. The only selection criteria used was that the population had to have some leaf rust resistant individuals in it.

Exhibit A Continued (Lakin PVPA)

1994: F_4 head rows were grown in the field at Hays and a single row was harvested. Six head selections were made from the row at harvest. The population of head rows were segregating as the F_3, however uniformity in maturity and height was used as selection criteria. Protein content, test weight, seed color, leaf rust resistance, and grain hardness were also criteria used.

1995: F_5 was tested in the preliminary yield test at 3 KS locations, the F_5 head selections were grown in the field at Hays, KS and one row was harvested after six head selections were made form the F_5 head row. Segregation was not observed within the line. Selection criteria included grain yield, test weight, height, maturity, grain hardness, polyphenol oxidase level, resistance to leaf rust, wheat streak mosaic virus, soilborne mosaic virus, spindle streak mosaic virus and bacterial leaf blight.

1996: F_6 was grown from seed from the F_5 head row. It was grown in the preliminary yield tests at 3 KS locations. The F_6 head rows were grown at Hays and a single row was harvested after 6 head selections were made. The line was observed to be segregating for reaction to stem rust. The reselection head row harvested was homozygous for stem rust resistance. Selection criteria included grain yield, test weight, height, maturity, winter hardiness, grain hardness, polyphenol oxidase level, salt noodle color stability, mixogram absorption and mix time. Disease resistance criteria included resistance to leaf rust and stem rust.

1997: F_7 was tested in the Advanced Yield test at 6 KS locations. Seed from the F6 head row was increased in the field at Hays, KS and 200 head selections were made from the increase plot. No segregation was observed in the line. Selection criteria were grain yield, test weight, height, maturity, shattering tolerance grain hardness, polyphenol oxidase level, salt noodle color stability, and hard wheat milling and baking quality. Disease resistance criteria included resistance to soilborne mosaic virus and wheat streak mosaic virus. Due to leaf rust race change in 1997 the line is now susceptible to our current races of leaf rust, thus leaf rust was not a selection criteria.

1998: F_8 was tested in the Kansas Intrastate Nursery (KIN) at 16 KS locations. The 200 head rows were grown at Hays and after making some discards for uniformity they were harvested in bulk. No segregation was identified among the head rows only a few off-types. Selection criteria were grain yield, test weight, height, maturity, shattering tolerance, grain hardness, polyphenol oxidase level, salt noodle color stability, and hard wheat milling and baking quality. Disease resistance criteria included resistance to soilborne mosaic virus and wheat streak mosaic virus

1999: F_9 was tested in the KIN, Southern Regional Performance Nursery (SRPN), and the Kansas Performance Tests with Winter Wheat Varieties. Seed from the F_8 head rows was planted at Hays to produce the original breeders seed. No segregation was observed in the

Exhibit A Continued (Lakin PVPA)

line. Selection criteria were the same as in 1998 except spindle streak mosaic virus resistance was used.

2000: F_{10} was tested in the same Nurseries as in 1999. Breeder's seed was planted at Hays to increase the breeder's seed. No segregation within the line was observed. Selection criteria used were grain yield, test weight, height, maturity, shattering tolerance, grain hardness, polyphenol oxidase level, salt noodle color stability, and hard wheat milling and baking quality. Criteria for disease resistance included only barley yellow dwarf mosaic virus.

2001 F_{11} was tested in the Kansas Performance Tests with Winter Wheat Varieties. The breeder's seed was planted at Hays to produce the foundation seed for distribution in the fall of 2001. No segregation was observed in the line. Selection criteria was primarily yield.

Lakin is uniform. Variants are limited to: slightly taller plants that occur at a frequency of less than 1 in 1,000 plants, plants with brown glumes that occur at a frequency of less than 1 in 1,000 plants, and plants that produce seed with a red seed coat that occur at a frequency of less that 1 in 200 plants. The variants in Lakin as well as the typical plants in Lakin are commercially acceptable.

Lakin is stable. When sexually reproduced, the variety remains unchanged in its essential and distinctive characteristics. Lakin was observed to be uniform and stable during the last four generations.

Lakin, PVP Application
Exhibit B: Statement of Distinctness

Lakin is most similar to Arlin.

Arlin heads 3 days earlier than Lakin (Appendix A, Table 1)

Lakin seed has a lower level of polyphenol oxidase than does the seed of Arlin (Appendix A, Table 2). In addition to the PPO ratings in table 2, the phenol reaction reported in exhibit C also supports this difference. Lakin seed give a fawn reaction while Arlin seed give a black reaction.

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Appendix A

Table 1. Relative heading dates (days +/- Scout 66) from the 1999 and 2000 Kansas Performance Tests with Winter Wheat Varieties.

	Days earlier (-) or later (+) than Scout 66						
	1999		2000				
Entry	FD*	FI	FD	SI	TI	FI	Avg.
Lakin	-0.8	-0.8	-1.5	-0.3	2.0	-0.5	-0.3
Arlin	-3.8	-3.5	-3.3	-5.5	-1.3	-2.8	-3.4
CV %	0.5	0.4	5.4	3.2	0.6	5.1	
LSD (.05)	0.8	0.7	0.6	1.3	0.9	0.6	

* These were the only locations in 1999 and 2000 that Lakin and Arlin were both tested. FD=Finney Co. dryland, FI=Finney Co. Irrigated, SI=Stafford Co., TI=Thomas Co.

Table 2. Relative polyphenol oxidase (PPO) levels of Lakin and various hard red and hard white wheat cultivars.

	FGIS	PPO Rating[1]	
Entry	Class	1999	2000
Lakin	HDWH	3.0	2.9
Arlin	HDWH	8.0	8.3
Trego	HDWH	7.0	7.0
Betty	HDWH	6.1	5.8
2137	HRW	4.5	4.5
Vista	HRW	5.4	5.9
TAM107	HRW	7.1	6.9
Karl 92	HRW	7.5	7.6
Ike	HRW	8.0	8.1
Jagger	HRW	8.2	7.9
CV (%)		7.7	5.2
LSD (.05)		0.64	0.49

[1] Rating made on a 1-9 scale with 1=lowest and 9=highest. PPO test was a modified version of that described by Shelton and Park, 1993 (Wheat Newsletter 39:325). The test was conducted in a randomized complete block design with 4 replications on grain from a replicated performance test grown at Hays, KS in 1999 and 2000.

REPRODUCE LOCALLY. Include form number and date on all reproductions. Form Approved - OMB No. 0581-0055

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
SCIENCE AND TECHNOLOGY
PLANT VARIETY PROTECTION OFFICE
BELTSVILLE, MD 20705

EXHIBIT C
(Wheat)

OBJECTIVE DESCRIPTION OF VARIETY
WHEAT (*Triticum* spp.)

NAME OF APPLICANT(S)	FOR OFFICIAL USE ONLY
Kansas Agricultural Experiment Station	PVPO NUMBER 200200049
ADDRESS (*Street and No. or RD No., City, State, and Zip Code*) Waters Hall Kansas State University Manhattan KS 66506	VARIETY NAME Lakin TEMPORARY OR EXPERIMENTAL DESIGNATION KS96HW115

PLEASE READ ALL INSTRUCTIONS CAREFULLY: Place the appropriate number that describes the varietal character of this variety in the boxes below. Place a zero in the first box (e.g. [0][9][9] or [0][9]) when number is either 99 or less or 9 or less respectively. Data for quantitative plant characters should be based on a minimum of 100 plants. Comparative data should be determined from varieties entered in the same trial. Royal Horticultural Society or any recognized color standard may be used to determine plant colors; designate system used:
Please answer all questions for your variety; lack of response may delay progress of your application.

1. KIND:

[1] 1=Common 2=Durum 3=Club 4=Other (SPECIFY): _____

2. VERNALIZATION:

[2] 1=Spring 2=Winter 3=Other (SPECIFY): _____

3. COLEOPTILE ANTHOCYANIN:

[1] 1=Absent 2=Present

4. JUVENILE PLANT GROWTH:

[1] 1=Prostrate 2=Semi-erect 3=Erect

5. PLANT COLOR (boot stage):

[2] 1 = Yellow-Green 2 = Green 3 = Blue-Green

6. FLAG LEAF (boot stage):

[1] 1 = Erect 2 = Recurved [1] 1 = Not Twisted 2 = Twisted

7. EAR EMERGENCE:

[ ][ ] Number of Days Earlier Than _____ *

[0][3] Number of Days Later Than Arlin *

3

8. ANTHER COLOR:

[1] 1 = Yellow 2 = Purple

9. PLANT HEIGHT (from soil to top of head, excluding awns):

[0][1] cm Taller Than Arlin *

[ ][ ] cm Shorter Than _____ *

* Relative to a PVPO-Approved Commercial Variety Grown in the Same Trial

10. STEM:

A. ANTHOCYANIN

[1] 1= Absent 2=Present

B. WAXY BLOOM

[2] 1=Absent 2=Present

C. HAIRINESS (last internode of rachis)

[2] 1=Absent 2=Present

D. INTERNODE (SPECIFY NUMBER)

[1] 1= Hollow 2=Semi-solid 3=Solid

E. PEDUNCLE

[2] 1=Absent 2=Present

[22] cm Length

11. HEAD (at Maturity):

A. DENSITY

[2] 1=Lax 2=Middense 3= Dense

B. SHAPE

[1] 1 = Tapering 2= Strap 3 = Clavate 4 = Other (SPECIFY): _____

C. CURVATURE

[2] 1 = Erect 2 = Inclined 3 = Recurved

D. AWNEDNESS

[4] 1 = Awnless 2 = Apically Awnletted 3 = Awnletted 4 = Awned

12. GLUMES (at Maturity):

A. COLOR

[1] 1 = White 2 = Tan 3 = Other (SPECIFY) : _____

B. SHOULDER

[2] 1 = Wanting 2 = Oblique 3 = Rounded 4 = Square 5 = Elevated 6 = Apiculate

C. BEAK

[3] 1 = Obtuse 2 = Acute 3 =Acuminate

D. LENGTH

[2] 1 = Short (ca. 7mm) 2 = Medium (ca. 8mm) 3 = Long (ca. 9mm)

12. GLUMES (at Maturity) *Continued*:

E. WIDTH

[2] 1 = Narrow (ca. 3mm) 2 = Medium (ca. 3.5mm) 3 = Wide (ca. 4mm)

13. SEED:

A. SHAPE

[3] 1 = Ovate 2 = Oval 3 = Elliptical

B. CHEEK

[2] 1=Rounded 2=Angular

C. BRUSH

[2] 1=Short 2=Medium 3=Long

[1] 1 = Not Collared 2 = Collared

D. CREASE

[2] 1 = Width 60% or less of Kernel
2 = Width 80% or less of Kernel
3 = Width Nearly as Wide as Kernel

[1] 1 = Depth 20% or less of Kernel
2 = Depth 35% or less of Kernel
3 = Depth 50% or less of Kernel

E. Color

[1] 1=White 2= Amber 3= Red 4= OTHER (Specify)

G. PHENOL REACTION *(see instructions)*:

[2] 1 = Ivory 2 = Fawn 3 = Light Brown 4 = Dark Brown 5 = Black

F. TEXTURE

[1] 1=Hard 2=Soft

14. DISEASE: (0=Not Tested; 1=Susceptible; 2=Resistant; 3=Intermediate; 4=Tolerant)

PLEASE INDICATE THE SPECIFIC RACE OR STRAIN TESTED

[3] Stem Rust *(Puccinia graminis* f. sp. *tritici)*
RTQQ

[1] Leaf Rust *(Puccinia recondita* f. sp. *tritici)*
TDBM TCLH TLLC MGBM KDBM

[1] Stripe Rust *(Puccinia striiformis)*

[1] Loose Smut *(Ustilago tritici)*

[1] Tan Spot *(Pyrenophora tritici-repentis)*

[0] Flag Smut *(Urocystis agropyri)*

[0] Halo Spot *(Selenophoma donacis)*

[0] Common Bunt *(Tilletia tritici* or *T. laevis)*

[1] *Septoria nodorum* (Glume Blotch)

[0] Dwarf Bunt *(Tilletia controversa)*

[0] *Septoria avenae* (Speckled Leaf Disease)

[0] Karnal Bunt *(Tilletia indica)*

[1] *Septoria tritici* (Speckled Leaf Blotch)

[1] Powdery Mildew *(Erysiphe graminis* f. sp. *tritici)*

[3] Scab (*Fusarium* spp.)

[0] "Snow Molds"

14. Disease *(Continued)* (0=Not Tested; 1=Susceptible; 2=Resistant; 3=Intermediate; 4=Tolerant)

PLEASE INDICATE THE SPECIFIC RACE OR STRAIN TESTED

[1]	"Black Point" (Kernel Smudge)	[0]	Common Root Rot *(Fusarium, Cochliobolus* and *Bipolaris* spp.*)*
[3]	Barley Yellow Dwarf Virus (BYDV)	[0]	Rhizoctonia Root Rot *(Rhizoctonia solani)*
[2]	Soilborne Mosaic Virus (SBMV)	[0]	Black Chaff *(Xanthomonas campestris* pv. *translucens)*
[3]	Wheat Yellow (Spindle Streak) Mosaic Virus	[0]	Bacterial Leaf Blight *(Pseudomonas syringae* pv. *syringae)*
[4]	Wheat Streak Mosaic Virus (WSMV)	[ ]	Other (SPECIFY)
[ ]	Other (SPECIFY)	[ ]	Other (SPECIFY)
[ ]	Other (SPECIFY)	[ ]	Other (SPECIFY)
[ ]	Other (SPECIFY)	[ ]	Other (SPECIFY)

15. INSECT: (0=Not Tested; 1=Susceptible; 2=Resistant; 3=Intermediate; 4=Tolerant)

PLEASE SPECIFY BIOTYPE (where needed)

[1]	Hessian Fly *(Mayetiola destructor)* Great Plains biotype	[ ]	Other (SPECIFY)
[0]	Stem Sawfly *(Cephus* spp.)	[ ]	Other (SPECIFY)
[0]	Cereal Leaf Beetle *(Oulema melanopa)*	[ ]	Other (SPECIFY)
[1]	Russian Aphid *(Diuraphis noxia*	[ ]	Other (SPECIFY)
[1]	Greenbug *(Schizaphis graminum)*	[ ]	Other (SPECIFY)
[0]	Aphids	[ ]	Other (SPECIFY)

16. ADDITIONAL INFORMATION ON ANY ITEM ABOVE, OR GENERAL COMMENTS

Lakin, PVP Application
Exhibit D: Additional description of the variety

Table 1 in Appendix B summarizes 3 years of quality data generated by the KSU Wheat Quality Lab. It compares Lakin with the two most popular wheats currently grown in Kansas, Jagger and 2137. It also compares Lakin's quality characteristics with those of the most popular hard white wheat currently grown in Kansas, Trego.

The hard wheat milling and bread baking quality of Lakin was compared to currently grown varieties by the members of the Wheat Quality Counsil in 1998. They rated Lakin's overall baking quality as above average. I have attached a copy of their report in appendix B.

Lakin has good potential in identity preserved production programs for supplying grain destined for Asian noodle production. In 1998 Lakin was submitted to the Wheat Marketing Center, Portland OR for its 1999 Asian Products Collaborative Study. All teams that tested Lakin rated it equal to the control flours, which were flours they brought with them that were currently being used at their home for the product they were making. Their report is also in Appendix B.

Appendix B

Table 1. Mean bread and alkaline noodle quality parameters measured on composite samples each year grown at up to eight western Kansas locations from 1998 to 2000.

	Lakin	Jagger	2137	Trego
Test weight (lbs/bu)	60.5	59.1	59.8	62.0
Grain hardness	74.5	78.0	73.3	78.0
Seed size (mg)	30.9	28.7	29.7	30.1
Quad-Sr flour yield (%)	70.1	70.4	68.7	69.4
Flour ash (%)	0.43	0.48	0.44	0.43
Flour color (L)	91.7	90.4	91.3	91.3
Flour protein (%)	10.8	12.5	11.6	11.0
Mixograph abs. (%)	62.8	64.8	61.8	61.5
Mixograph peak time (min.)	4.4	4.4	3.4	3.3
Bake abs. (%)	61.3	62.0	61.8	60.7
Bake mix time (min)	4.6	4.5	3.8	3.9
Oxidation (asc. acid PPM)	33.3	33.7	54.3	54.3
Loaf volume (cc)	893	960	887	883
Crumb grain score	3.6	3.7	3.7	3.4
RVA viscosity	207	216	200	263
Noodle L @ 0	84.1	81.0	81.8	82.4
Noodle L @ 24 hr	77.4	70.7	73.3	73.3
Noodle L @ 48 hr	75.1	67.0	70.2	70.0

1998
Milling and Baking Test Results
for
Hard Winter Wheats

Editor:
Patrick J. McCluskey
Department of Grain Science
Kansas State University
Manhattan, KS

Coordinator:
Ben Handcock, Executive Vice President
Wheat Quality Council
Pierre, SD

Kansas: 1998 (Small-Scale) Samples

Sample Number	98-404	98-405	98-406	98-407	98-408	98-409	98-410	98-411
Variety Identification	Karl 92 (check)	Lamed (check)	KS95 H167-3	KS95 HW62-6	KS96 HW94	KS96 HW118 (Lakin)	KS84 063-2W	KS85 W663-42W
Wheat Data								
FGIS Classification	HRW	HRW	HRW 1.1% HDWH	HDWH	HDWH 0.4% HRW	HDWH 0.9% HRW	HDWH	HDWH 0.6% HRW
Test Weight (lb/bu)	59.8	60.5	59.6	59.7	60.1	60.4	59.3	60.4
Hectoliter Weight (kg/hl)	78.7	79.6	78.4	78.6	79.1	79.5	78.0	79.5
1000 Kernel Weight (gm)	26.8	28.4	28.4	26.3	24.2	29.5	25.7	25.4
NIR Hardness	57	74	67	74	67	54	72	51
Wheat Size Test								
Over 7 Wire (%)	40.2	52.1	56.8	40.4	32.4	56.2	44.7	34.6
Over 9 Wire (%)	59.2	47.1	42.9	58.6	66.1	43.5	54.8	64.7
Through 9 Wire (%)	0.6	0.8	0.3	1.0	1.5	0.4	0.5	0.7
Single Kernel Analysis								
Hardness	64	76	69	81	81	69	78	60
Weight (mg)	28.1	30.3	29.9	28.2	26.0	30.3	26.2	26.1
Diameter (mm)	2.32	2.44	2.44	2.30	2.28	2.44	2.21	2.25
Moisture (%)	10.2	10.4	10.2	10.4	10.3	10.5	10.4	10.4
Protein (%)**	13.6	13.6	12.9	13.5	13.9	13.1	15.1	14.4
Ash (%)*	1.40	1.48	1.43	1.47	1.49	1.38	1.45	1.33
Miling and Straight Grade Flour Data								
	98-404	98-405	98-406	98-407	98-408	98-409	98-410	98-411
Straight Grade Flour Yield (%T.P.)	74.7	74.1	74.0	74.2	74.6	75.9	71.6	73.6
Moisture (%)	13.7	13.5	13.2	14.1	13.8	13.5	14.1	14.0
Protein (%)*	12.4	12.3	11.7	12.1	12.3	12.0	14.2	13.5
Ash (%)*	0.46	0.46	0.44	0.44	0.44	0.41	0.46	0.41
Glutomatic								
Wet (%)*	30.2	34.5	30.5	31.9	26.9	31.5	37.0	34.7
Dry (%)*	11.4	12.0	10.8	11.2	10.0	10.7	12.9	12.4
Index	98.5	95.4	97.4	96.4	99.3	98.7	97.7	97.7
Color								
Agtron Flour Color	85	82	84	83	83	89	82	89
Simon Flour Color	-0.13	0.45	0.32	-0.19	0.09	-0.54	-0.71	-0.93
Falling Number* (sec)	561	633	437	559	567	532	530	478
Avg. Micron Size Fisher Sub Sieve Sizer	19.5	22.9	21.3	23.7	21.9	20.5	22.5	20.2

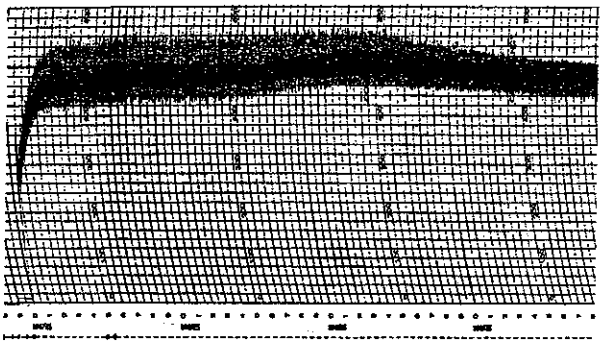
** 12% moisture basis; *14% moisture basis

Physical Dough Tests

1998 (Small Scale) Kansas

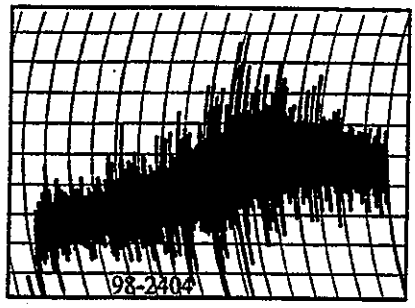
Farinograms

Mixograms

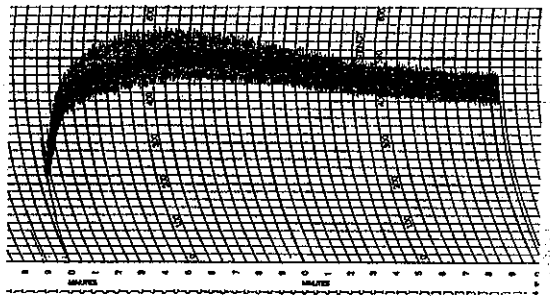


Abs: 58.7%, Peak: 25.5, Stab: 40.0

98-404
Karl 92 (check)

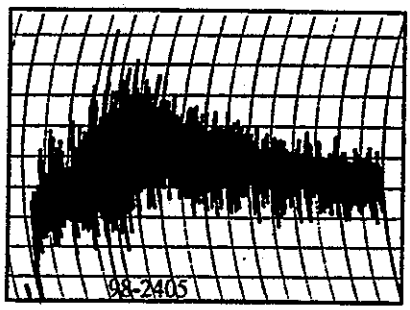


Abs: 63.6%, Peak: 5.4, Stab: 5

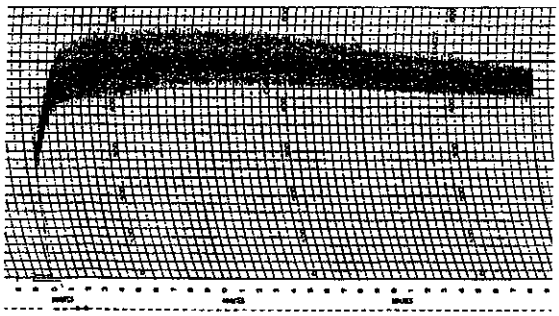


Abs: 62.9%, Peak: 6.5, Stab: 11.0

98-405
Larned (check)

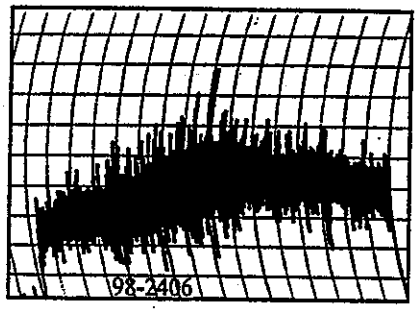


Abs: 64.0%, Peak: 2.6, Stab: 4

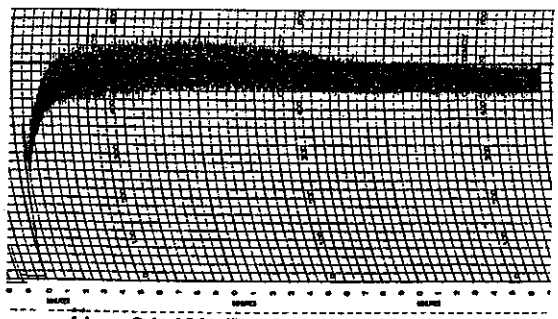


Abs: 57.6%, Peak: 12.5, Stab: 24.0

98-406
KS95HW167-3

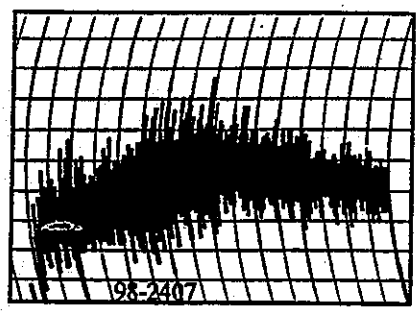


Abs: 63.0%, Peak: 4.5, Stab: 4



Abs: 61.1%, Peak: 10.0, Stab: 21.0

98-407
KS95HW62-6



Abs: 64.0%, Peak: 3.9, Stab: 4

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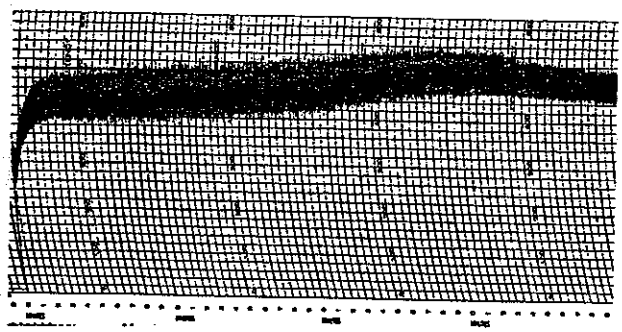
Physical Dough Tests

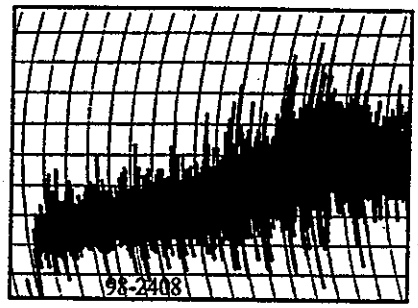
1998 (Small Scale) Kansas

Farinograms

Mixograms

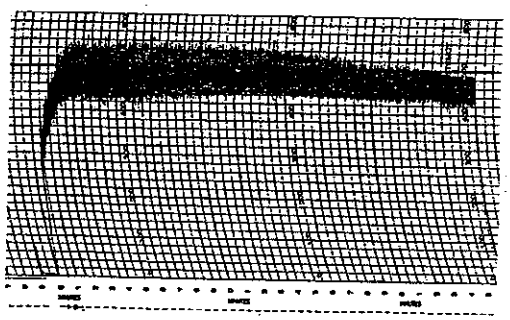


98-408
KS96HW94

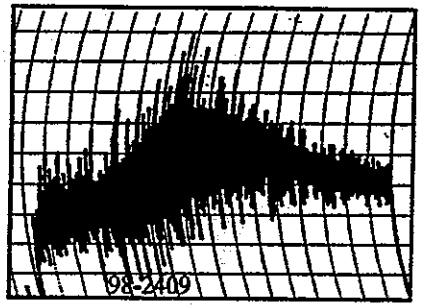


Abs: 61.8%, Peak: 32.0, Stab: 35.5

Abs: 65.0%, Peak: 7.4, Stab: 5

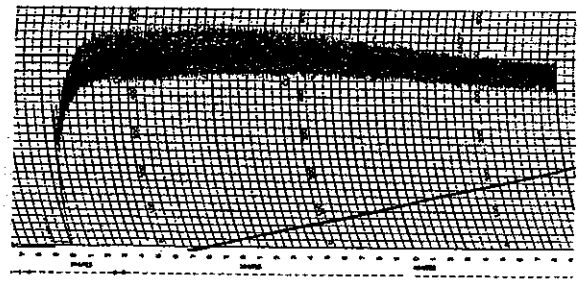


98-409
KS96HW115
Lakin

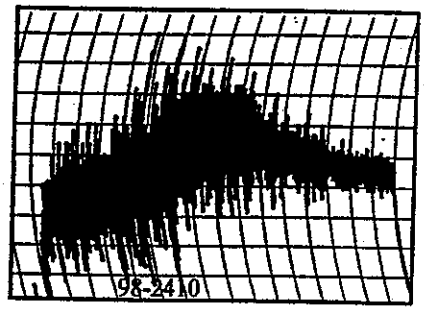


Abs: 57.4%, Peak: 10.0, Stab: 21.5

Abs: 64.0%, Peak: 3.9, Stab: 3

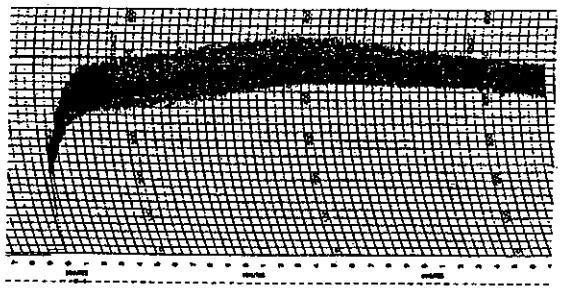


98-410
KS84063-2W

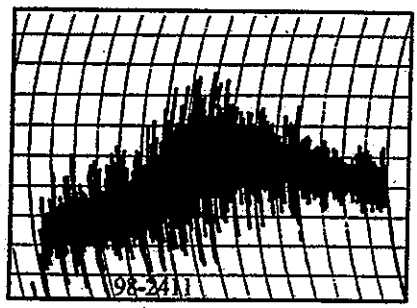


Abs: 62.1%, Peak: 10.5, Stab: 24.0

Abs: 66.7%, Peak: 4.0, Stab: 3



98-411
KS85W663-42W



Abs: 59.0%, Peak: 16.5, Stab: 20.5

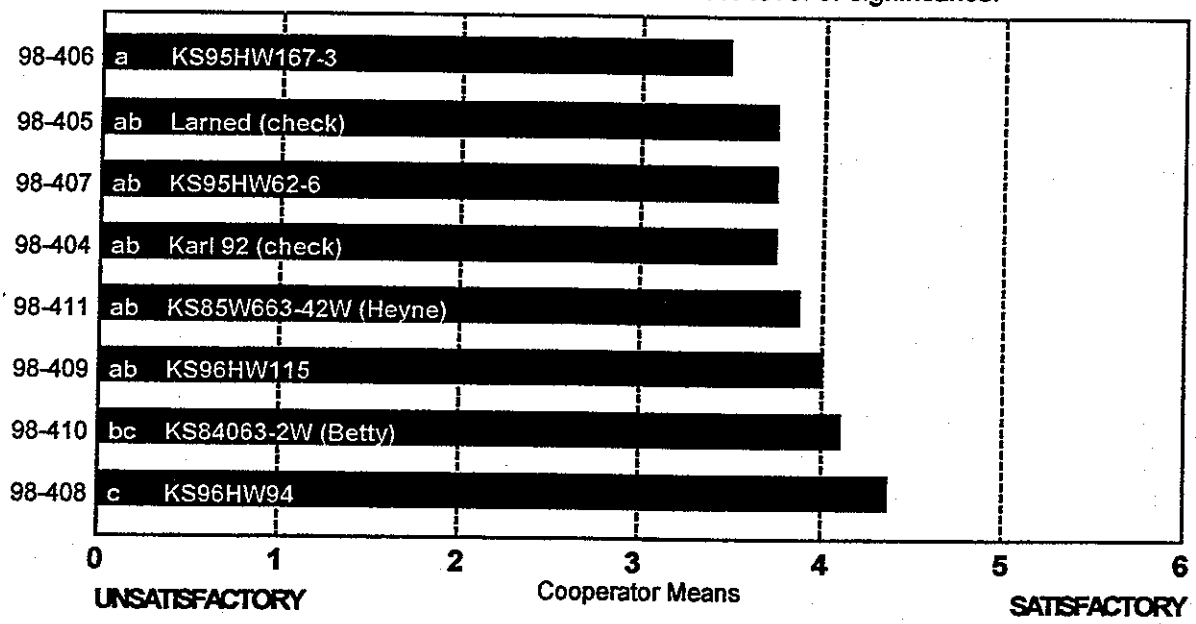
Abs: 65.4%, Peak: 4.4, Stab: 3

SPONGE CHARACTERISTICS

(Small Scale) Kansas

ncoop= 8
chisq= -3.06
chisqc= 24.92
cvchisq= 14.07
crdiff= 12.99

Variety order by rank sum.
Samples with the same letter not different at 5.0% level of significance.



mean= 3.50
r sum= 27.50
mean= 3.75
r sum= 31.00
mean= 3.75
r sum= 32.00
mean= 3.75
r sum= 32.50
mean= 3.88
r sum= 35.18
mean= 4.00
r sum= 38.00
mean= 4.13
r sum= 40.68
mean= 4.38
r sum= 45.68

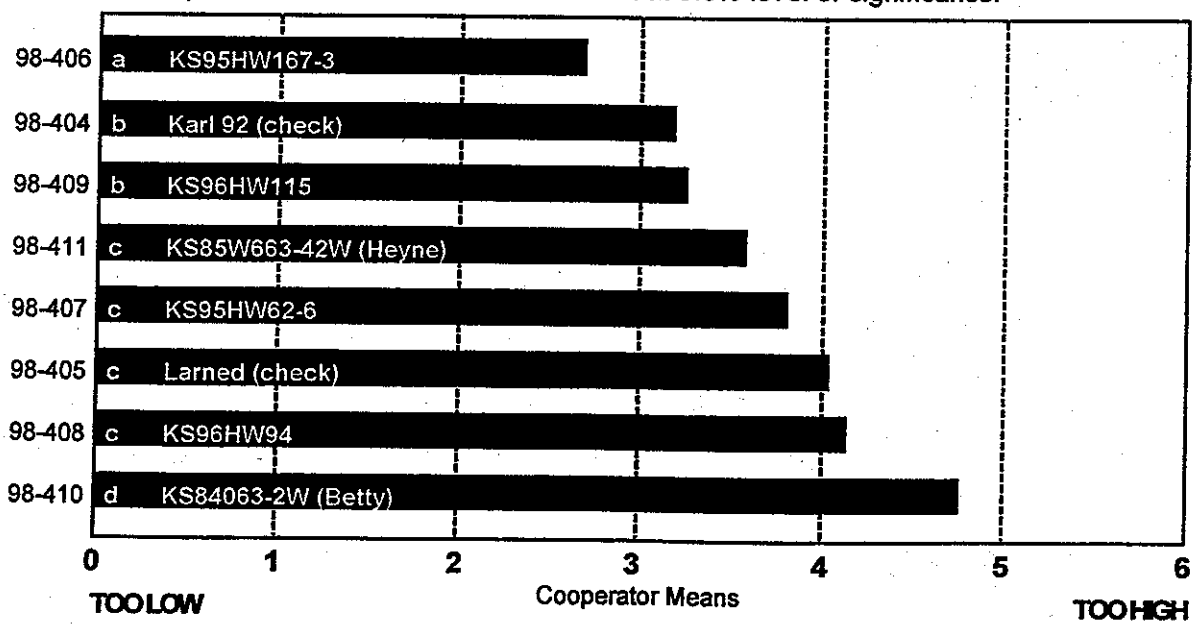
Lakin

BAKE ABSORPTION

(Small Scale) Kansas

ncoop= 15
chisq= 47.01
chisqc= 66.10
cvchisq= 14.07
crdiff= 16.69

Variety order by rank sum.
Samples with the same letter not different at 5.0% level of significance.



mean= 2.70
r sum= 27.00
mean= 3.20
r sum= 51.00
mean= 3.27
r sum= 52.50
mean= 3.60
r sum= 69.50
mean= 3.83
r sum= 73.00
mean= 4.03
r sum= 73.00
mean= 4.13
r sum= 85.00
mean= 4.77
r sum= 109.00

Lakin

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BAKE ABSORPTION, ACTUAL (14% MB)

(Small Scale) Kansas

	Coop. A	Coop. B	Coop. C	Coop. D	Coop. E	Coop. F	Coop. G	Coop. H	Coop. I	Coop. J	Coop. K	Coop. L	Coop. M	Coop. N	Coop. O	Coop. P
98-404 Karl 92 (check)	59.0	62.0	58.6	59.0	66.4	62.9	59.0	59.0	68.3	66.9	58.2	63.6	64.0	59.6	62.5	60.6
98-405 Larned (check)	63.5	62.0	59.0	62.0	65.2	62.7	61.0	59.0	68.4	66.7	63.8	64.0	63.5	63.5	63.0	61.1
98-406 KS95HW167-3	59.5	61.0	58.0	59.0	63.8	60.3	60.0	59.0	67.2	65.3	59.9	63.0	62.0	57.7	62.0	59.9
98-407 KS95HW62-6	62.5	62.0	59.0	60.0	66.9	63.5	62.0	59.0	68.9	65.8	58.6	64.0	64.5	62.5	63.0	61.6
98-408 KS96HW94	60.0	62.0	60.0	60.0	69.0	66.0	61.0	59.0	69.5	67.2	60.9	65.0	65.0	63.0	64.0	62.4
98-409 KS96HW115	60.5	62.0	59.0	59.0	65.1	63.6	61.0	59.0	68.3	65.6	58.1	64.0	63.5	58.4	63.0	61.1
98-410 KS84063-2W (Betty)	63.0	64.0	61.7	60.0	68.8	66.4	64.0	61.0	71.4	69.8	59.6	66.7	67.0	64.7	65.0	63.1
98-411 KS85W663-42W (Heyne)	61.0	64.0	60.4	59.0	65.7	64.1	60.0	60.0	70.2	66.2	57.0	65.4	63.5	59.5	64.5	61.5

Raw Data

BAKE MIX TIME, ACTUAL

(Small Scale) Kansas

	Coop. A	Coop. B	Coop. C	Coop. D	Coop. E	Coop. F	Coop. G	Coop. H	Coop. I	Coop. J	Coop. K	Coop. L	Coop. M	Coop. N	Coop. O	Coop. P
98-404 Karl 92 (check)	60.0	9.0	6.0	22.0	9.5	6.3	7.2	20.0	9.0	6.9	13.0	5.8	30.0	4.8	21.0	4.8
98-405 Larned (check)	33.0	6.0	5.0	19.0	3.8	2.8	4.0	7.0	5.0	3.1	5.0	3.0	5.0	2.5	11.0	2.5
98-406 KS95HW167-3	35.0	9.0	6.0	19.0	6.0	4.2	5.6	9.0	4.0	5.0	8.0	4.3	9.0	3.8	9.0	3.5
98-407 KS95HW62-6	32.0	6.0	7.0	20.0	5.5	3.8	5.2	11.0	4.0	4.2	8.0	4.5	6.0	3.5	10.0	3.5
98-408 KS96HW94	60.0	9.0	7.0	20.0	13.0	8.0	10.2	20.0	11.0	8.7	20.0	7.8	25.0	6.5	25.0	6.8
98-409 KS96HW115	4.0	6.0	6.5	20.0	5.1	4.2	5.0	16.0	6.0	4.2	7.0	4.0	7.0	3.3	10.0	3.0
98-410 KS84063-2W (Betty)	60.0	6.0	7.5	20.0	5.5	4.2	5.2	13.0	6.0	4.2	11.0	4.5	12.0	3.8	13.0	3.3
98-411 KS85W663-42W (Heyne)	60.0	9.0	5.5	20.0	6.0	4.8	5.0	12.0	7.0	4.7	8.0	4.5	16.0	3.3	9.0	3.0

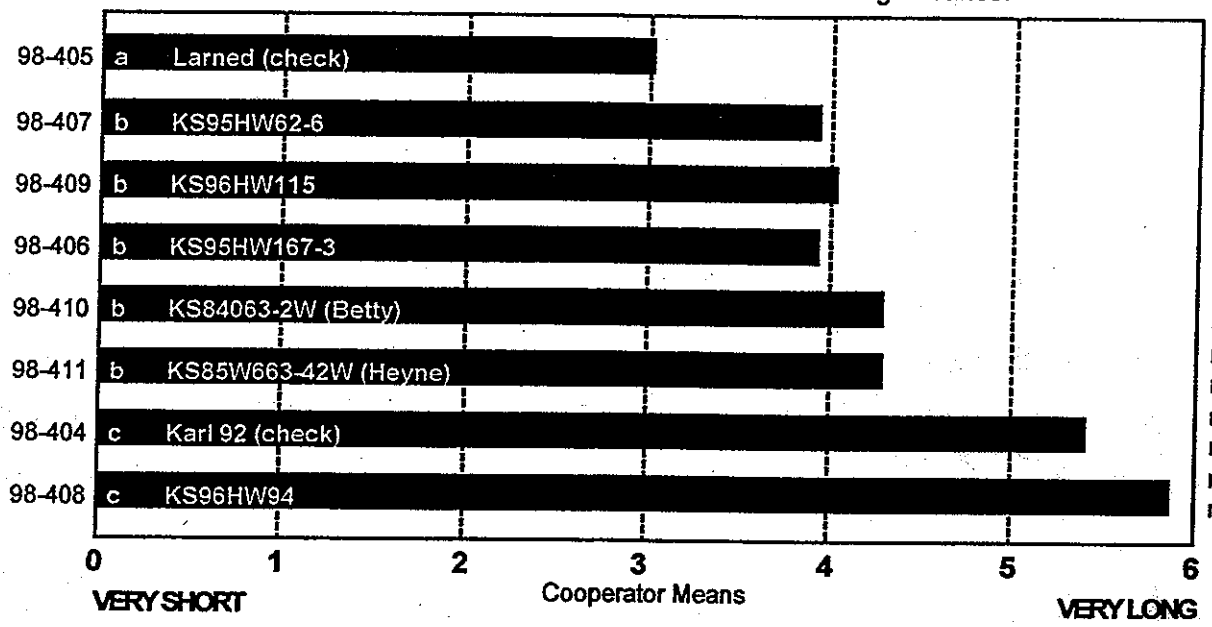
Raw Data

BAKE MIX TIME

(Small Scale) Kansas

ncoop= 15
chisq= 57.15
chisqc= 65.58
cvchisq= 14.07
crdiff= 15.94

Variety order by rank sum.
Samples with the same letter not different at 5.0% level of significance.



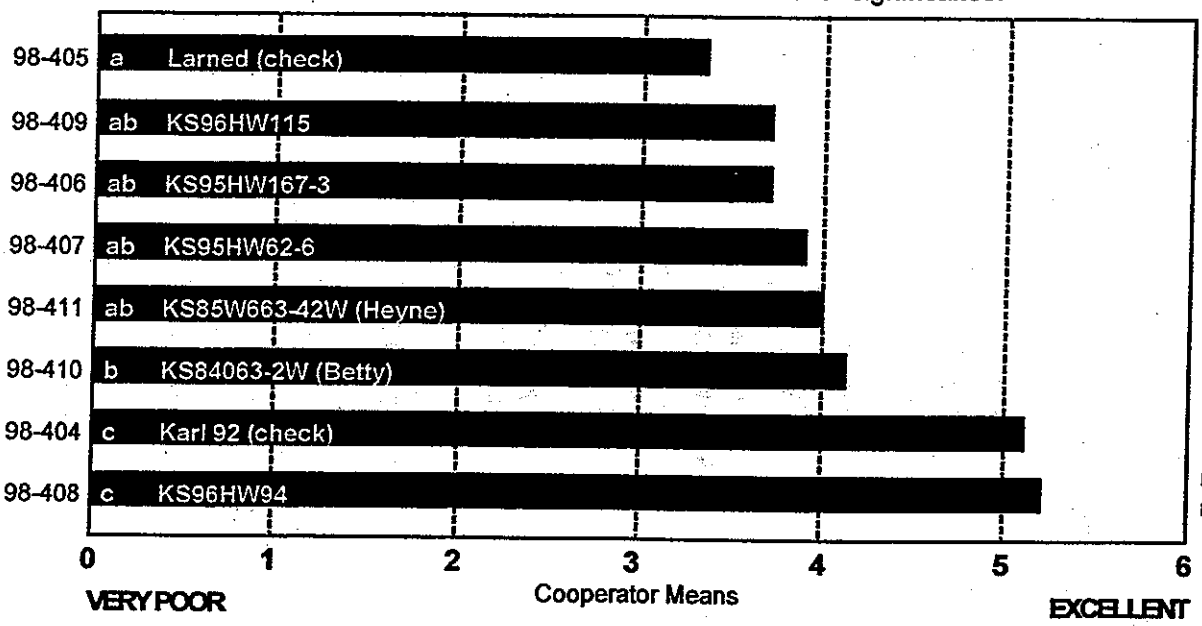
mean= 3.03
r sum= 26.50
mean= 3.95
r sum= 53.00
mean= 4.05
r sum= 55.00
mean= 3.97
r sum= 58.50
mean= 4.31
r sum= 67.00
mean= 4.31
r sum= 68.00
mean= 5.42
r sum= 101.00
mean= 5.90
r sum= 111.00

MIXING TOLERANCE

(Small Scale) Kansas

ncoop= 14
chisq= 39.75
chisqc= 48.14
cvchisq= 14.07
crdiff= 17.50

Variety order by rank sum.
Samples with the same letter not different at 5.0% level of significance.



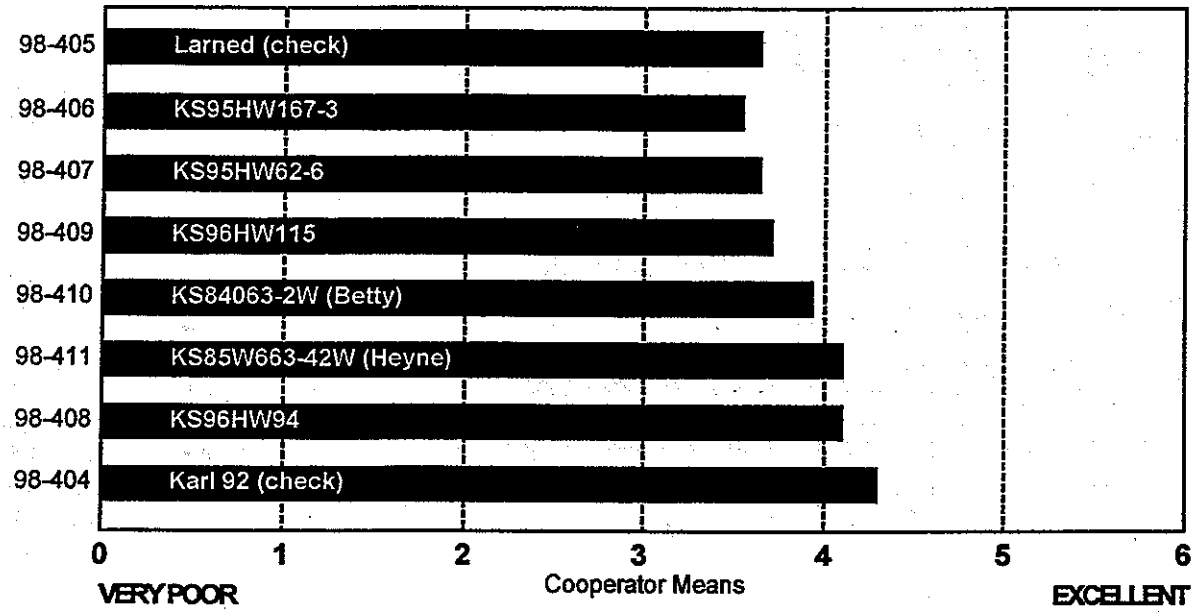
mean= 3.36
r sum= 43.50
mean= 3.71
r sum= 44.50
mean= 3.71
r sum= 49.00
mean= 3.93
r sum= 55.00
mean= 4.00
r sum= 56.50
mean= 4.14
r sum= 61.50
mean= 5.14
r sum= 97.00
mean= 5.21
r sum= 97.00

DOUGH CHAR. 'OUT OF MIXER'

(Small Scale) Kansas

ncoop= 15
chisq= 7.34
chisqc= 13.60
cvchisq= 14.07
crdiff=

Variety order by rank sum.
No samples different at 5.0% level of significance.



mean= 3.67
r sum= 57.00
mean= 3.55
r sum= 57.50
mean= 3.65
r sum= 58.50
mean= 3.73
r sum= 63.00
mean= 3.97
r sum= 68.56
mean= 4.10
r sum= 73.50
mean= 4.11
r sum= 77.50
mean= 4.31
r sum= 84.00

Lakin

DOUGH CHAR. 'OUT OF MIXER', DESCRIBED

(Small Scale) Kansas

	Sticky	Wet	Tough	Good	Excellent
98-404 Karl 92 (check)	0	0	6	8	1
98-405 Larned (check)	0	1	3	10	1
98-406 KS95HW167-3	0	1	3	10	1
98-407 KS95HW62-6	3	0	3	9	0
98-408 KS96HW94	1	0	8	5	1
98-409 KS96HW115	1	0	3	9	2
98-410 KS84063-2W (Betty)	1	0	5	7	2
98-411 KS85W663-42W (Heyne)	0	0	4	7	4

Frequency Table

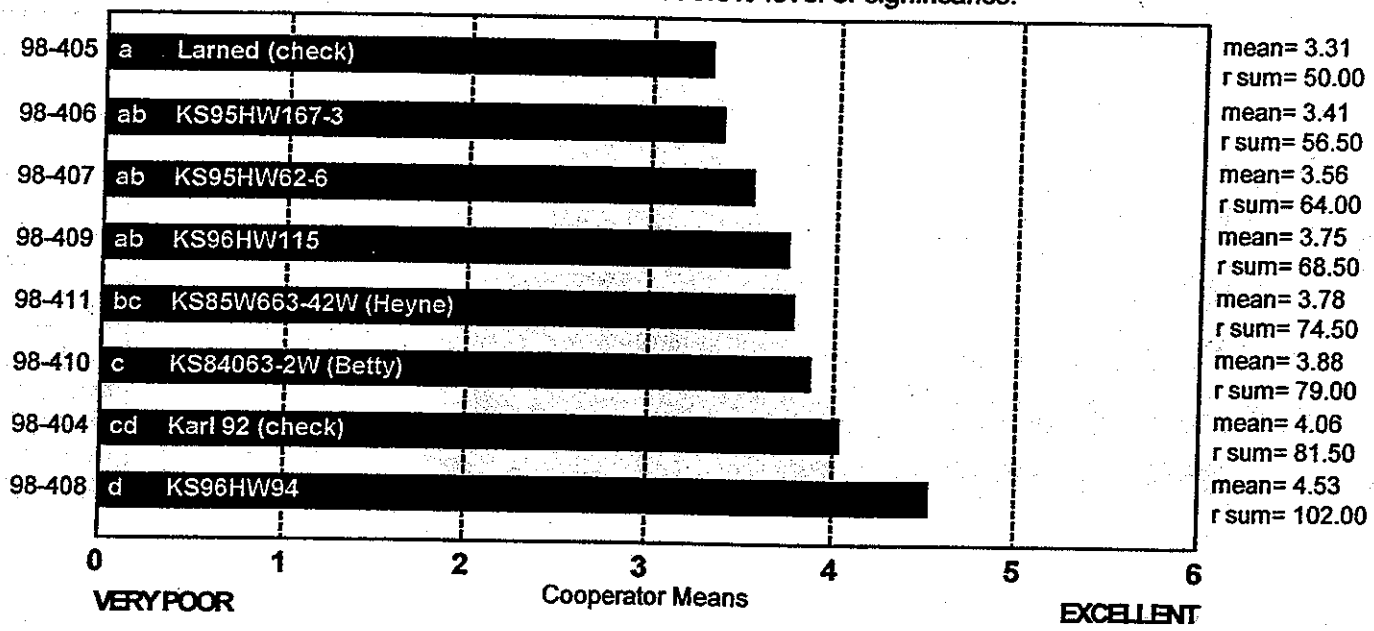
22

DOUGH CHAR. 'AT MAKE UP'

(Small Scale) Kansas

ncoop= 16
chisq= 19.23
chisqc= 25.51
cvchisq= 14.07
crdiff= 21.91

Variety order by rank sum.
Samples with the same letter not different at 5.0% level of significance.



DOUGH CHAR. 'AT MAKE UP', DESCRIBED

(Small Scale) Kansas

	Sticky	Wet	Tough	Good	Excellent
98-404 Karl 92 (check)	0	0	7	5	3
98-405 Larned (check)	0	0	1	13	0
98-406 KS95HW167-3	0	1	4	8	2
98-407 KS95HW62-6	0	0	2	12	1
98-408 KS96HW94	0	0	12	3	0
98-409 KS96HW115	0	0	3	10	2
98-410 KS84063-2W (Betty)	0	0	6	6	3
98-411 KS85W663-42W (Heyne)	0	0	5	7	3

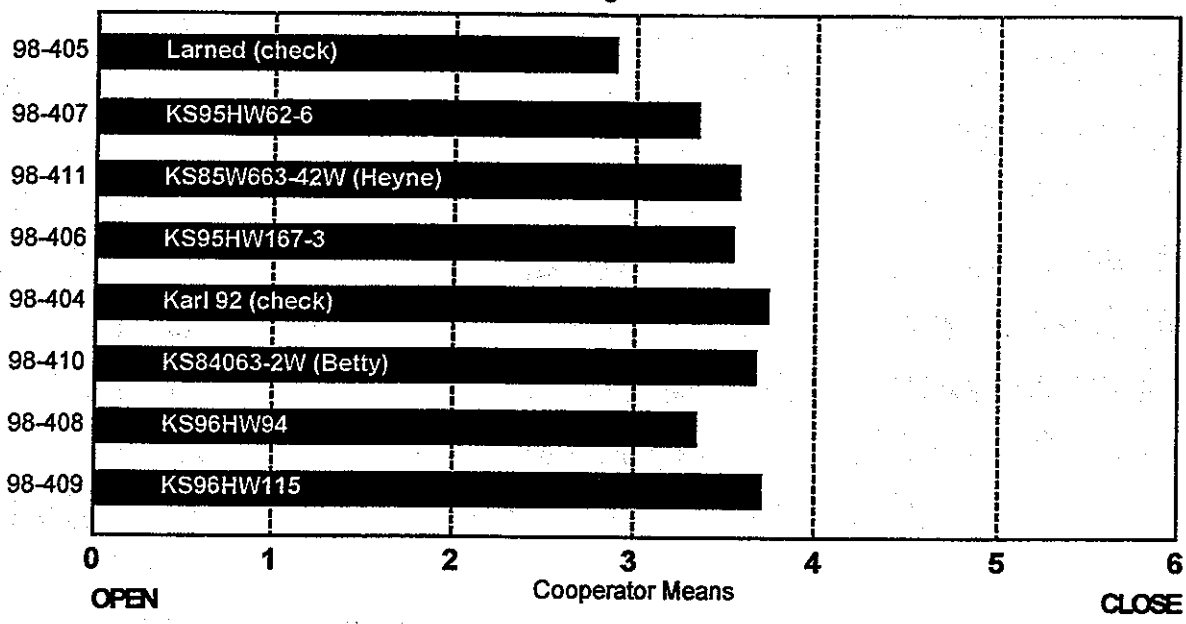
Frequency Table

CRUMB GRAIN

(Small Scale) Kansas

ncoop= 16
chisq= 7.44
chisqc= 9.01
cvchisq= 14.07
crdiff=

Variety order by rank sum.
No samples different at 5.0% level of significance.



Lakin

CRUMB GRAIN, DESCRIBED

(Small Scale) Kansas

	Open	Dense	Irregular
98-404 Karl 92 (check)	5	4	3
98-405 Larned (check)	8	3	2
98-406 KS95HW167-3	5	3	4
98-407 KS95HW62-6	7	3	4
98-408 KS96HW94	5	5	2
98-409 KS96HW115	4	4	3
98-410 KS84063-2W (Betty)	8	4	2
98-411 KS85W663-42W (Heyne)	8	5	1

Frequency Table

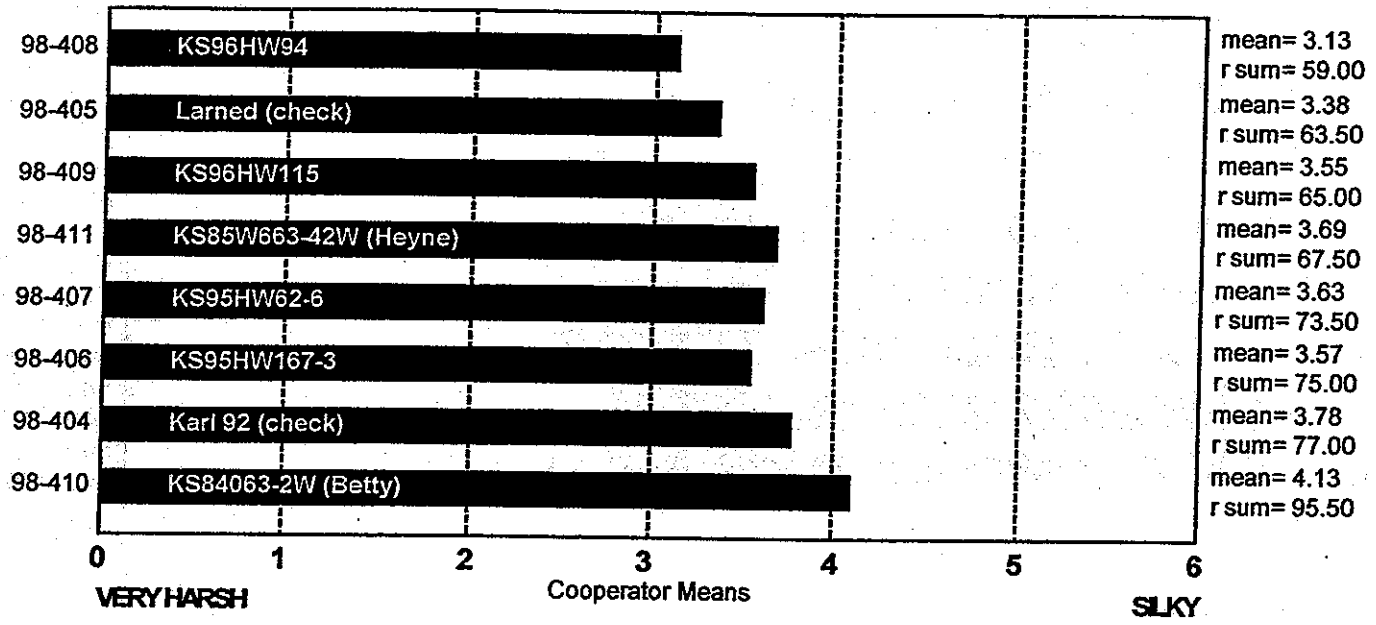
24

CRUMB TEXTURE

(Small Scale) Kansas

ncoop= 16
chisq= 9.36
chisqc= 13.30
cvchisq= 14.07
crdiff=

Variety order by rank sum.
No samples different at 5.0% level of significance.



CRUMB TEXTURE, DESCRIBED

(Small Scale) Kansas

	Coarse	Harsh	Silky
98-404 Karl 92 (check)	3	2	8
98-405 Larned (check)	2	5	7
98-406 KS95HW167-3	4	3	6
98-407 KS95HW62-6	1	4	9
98-408 KS96HW94	4	5	5
98-409 KS96HW115	3	3	7
98-410 KS84063-2W (Betty)	2	3	9
98-411 KS85W663-42W (Heyne)	3	2	8

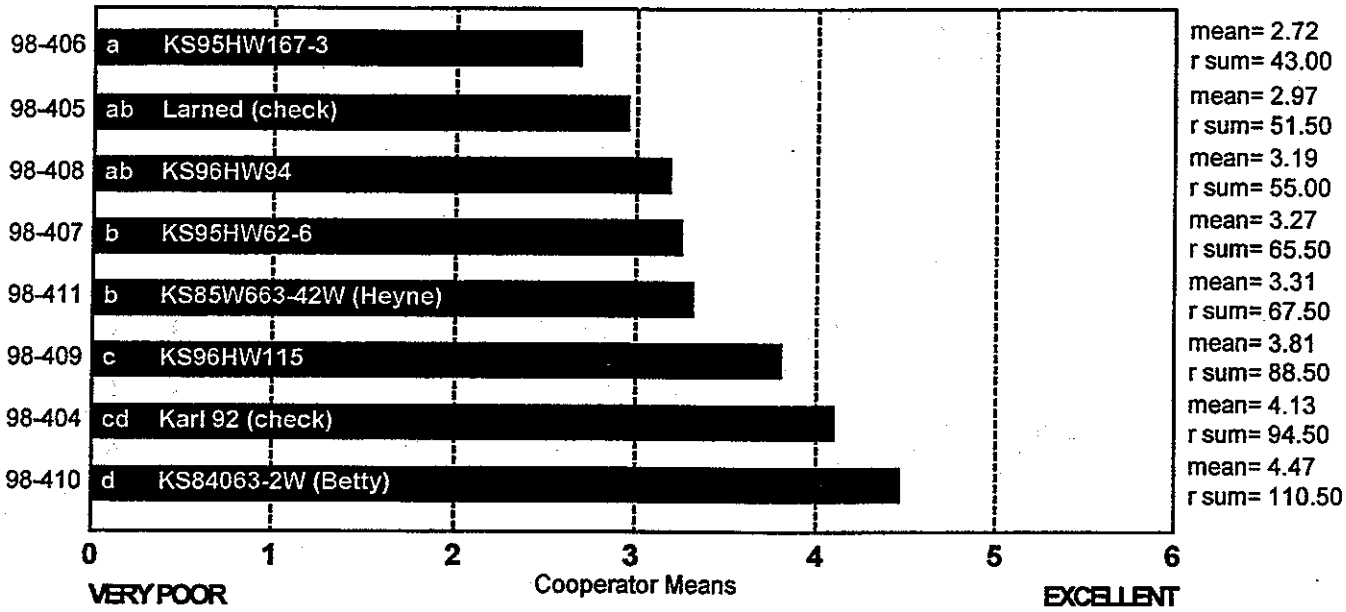
Frequency Table

CRUMB COLOR

(Small Scale) Kansas

ncoop= 16
chisq= 40.35
chisqc= 51.26
cvchisq= 14.07
crdiff= 18.77

Variety order by rank sum.
Samples with the same letter not different at 5.0% level of significance.



mean= 2.72
r sum= 43.00
mean= 2.97
r sum= 51.50
mean= 3.19
r sum= 55.00
mean= 3.27
r sum= 65.50
mean= 3.31
r sum= 67.50
mean= 3.81
r sum= 88.50
mean= 4.13
r sum= 94.50
mean= 4.47
r sum= 110.50

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CRUMB COLOR, DESCRIBED

(Small Scale) Kansas

	Yellow	Gray	Dull	Creamy	Bright White
98-404 Karl 92 (check)	2	0	1	5	6
98-405 Larned (check)	5	0	1	7	0
98-406 KS95HW167-3	5	0	4	5	0
98-407 KS95HW62-6	3	0	3	7	1
98-408 KS96HW94	4	0	2	6	2
98-409 KS96HW115	2	0	0	9	2
98-410 KS84063-2W (Betty)	1	0	0	6	6
98-411 KS85W663-42W (Heyne)	4	0	1	7	1

Frequency Table

26

CELL SHAPE, DESCRIBED

(Small Scale) Kansas

	Round	Irregular	Elongated
98-404 Karl 92 (check)	0	9	5
98-405 Larned (check)	2	8	4
98-406 KS95HW167-3	1	10	2
98-407 KS95HW62-6	3	9	1
98-408 KS96HW94	2	10	2
98-409 KS96HW115	3	6	5
98-410 KS84063-2W (Betty)	1	7	6
98-411 KS85W663-42W (Heyne)	1	8	4

Frequency Table

CELL THICKNESS, DESCRIBED

(Small Scale) Kansas

	Too Thin	Too Thick	Variable	Broken	Acceptable
98-404 Karl 92 (check)	1	0	6	0	6
98-405 Larned (check)	0	3	4	0	6
98-406 KS95HW167-3	0	2	8	0	4
98-407 KS95HW62-6	0	3	6	0	4
98-408 KS96HW94	1	3	4	0	5
98-409 KS96HW115	0	2	6	0	5
98-410 KS84063-2W (Betty)	0	2	7	0	4
98-411 KS85W663-42W (Heyne)	0	2	5	0	6

Frequency Table

LOAF WEIGHT, ACTUAL

(Small Scale) Kansas

	Coop. A	Coop. B	Coop. C	Coop. D	Coop. E	Coop. F	Coop. G	Coop. H	Coop. I	Coop. J	Coop. K	Coop. L	Coop. M	Coop. N	Coop. O	Coop. P
98-404 Karl 92 (check)	466.0		490.0		153.4	139.0	132.4	421.0	454.0	150.5	597.0	139.7	460.2	130.0	421.2	131.6
98-405 Larned (check)	456.0		495.0		152.5	139.8	136.3	423.0	448.0	154.0	594.0	141.2	461.1	135.0	418.5	133.7
98-406 KS95HW167-3	462.0		490.0		149.1	136.7	136.1	420.0	449.0	150.0	594.0	139.7	459.6	129.0	417.0	133.9
98-407 KS95HW62-6	457.0		490.0		153.0	138.6	136.0	419.3	448.0	150.8	597.0	142.7	461.4	133.0	416.8	137.2
98-408 KS96HW94	464.0		495.0		151.8	139.2	136.3	422.5	453.0	151.2	605.0	144.6	460.8	133.0	422.7	134.8
98-409 KS96HW115	462.0		495.0		152.0	140.4	136.1	420.5	448.0	153.4	598.0	145.6	464.3	132.0	419.1	137.4
98-410 KS84063-2W (Betty)	457.0		495.0		152.9	139.2	142.1	422.0	451.0	154.6	596.0	144.7	459.8	135.0	417.8	138.5
98-411 KS85W663-42W (Heyne)	460.0		495.0		151.0	138.2	136.6	420.0	446.0	149.4	594.0	146.2	463.0	132.0	418.9	136.2

Raw Data

LOAF VOLUME, ACTUAL

(Small Scale) Kansas

	Coop. A	Coop. B	Coop. C	Coop. D	Coop. E	Coop. F	Coop. G	Coop. H	Coop. I	Coop. J	Coop. K	Coop. L	Coop. M	Coop. N	Coop. O	Coop. P
98-404 Karl 92 (check)	2600	1125	2850	3045	970	955	970	2800	2625	955	2625	1025	3000	995	2226	900
98-405 Larned (check)	2600	990	3125	2809	900	900	940	2800	2550	1020	2350	925	2800	915	2133	800
98-406 KS95HW167-3	2625	1095	3125	2839	975	965	930	2800	2500	1010	2450	920	2875	950	2256	855
98-407 KS95HW62-6	2600	1045	3050	2853	970	915	915	2800	2325	925	2375	875	2725	925	2250	795
98-408 KS96HW94	2550	900	2475	2750	950	915	955	2700	2275	915	2600	950	2500	965	2103	840
98-409 KS96HW115	2650	1045	2975	2750	925	960	935	2700	2425	995	2300	945	2725	925	2256	825
98-410 KS84063-2W (Betty)	2675	980	3300	2927	1005	1105	990	2800	2375	1045	2425	1100	2913	1060	2183	865
98-411 KS85W663-42W (Heyne)	2775	1055	2900	2868	975	1000	1020	2750	2550	1025	2450	975	2825	1025	2153	890

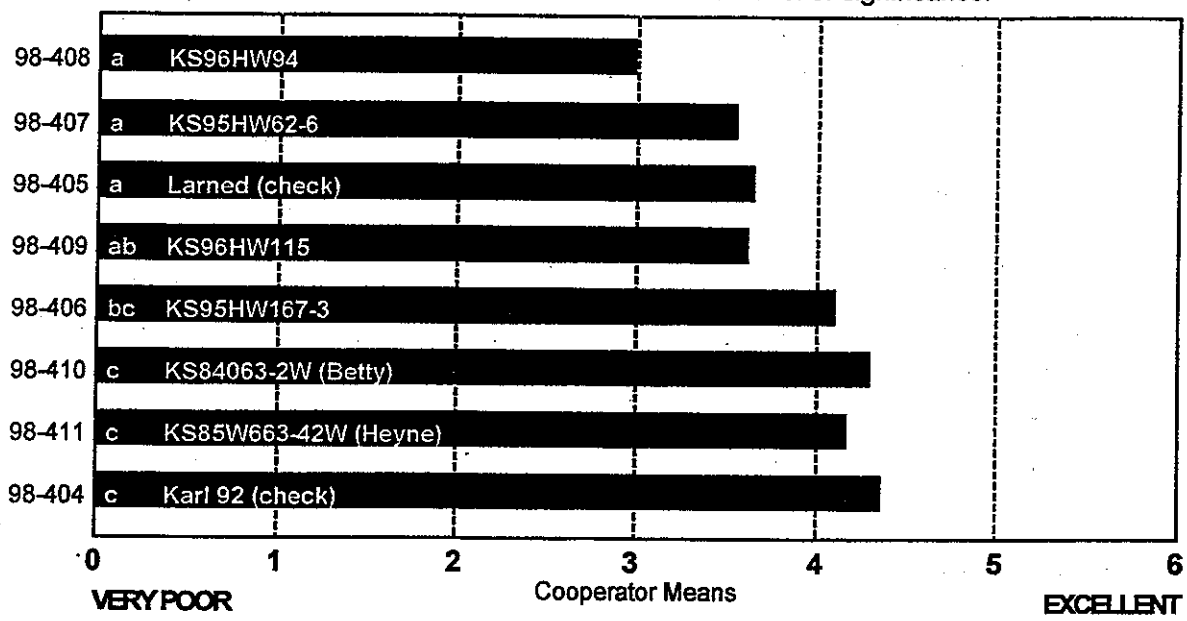
Raw Data

LOAF VOLUME

(Small Scale) Kansas

ncoop= 15
chisq= 20.06
chisqc= 25.45
cvchisq= 14.07
crdiff= 21.54

Variety order by rank sum.
Samples with the same letter not different at 5.0% level of significance.



mean= 3.00
r sum= 42.50
mean= 3.55
r sum= 54.50
mean= 3.65
r sum= 57.00
mean= 3.61
r sum= 59.00
mean= 4.13
r sum= 79.00
mean= 4.31
r sum= 81.00
mean= 4.18
r sum= 82.50
mean= 4.38
r sum= 84.50

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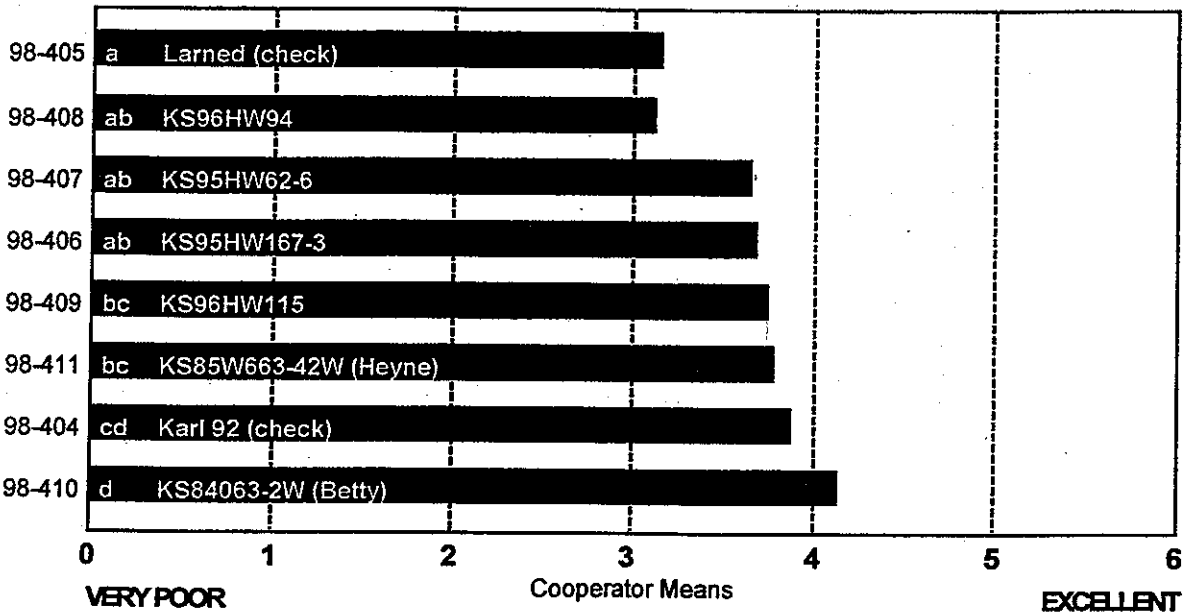
OVERALL BAKING QUALITY

(Small Scale) Kansas

ncoop= 15
chisq= 15.39
chisqc= 18.16
cvchisq= 14.07
crdiff= 23.34

Variety order by rank sum.
Samples with the same letter not different at 5.0% level of significance.



mean= 3.16
r sum= 46.00
mean= 3.13
r sum= 54.00
mean= 3.66
r sum= 63.50
mean= 3.69
r sum= 64.00
mean= 3.77
r sum= 69.50
mean= 3.79
r sum= 72.00
mean= 3.88
r sum= 81.00
mean= 4.16
r sum= 90.00

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COOPERATOR'S COMMENTS
(Small Scale) Kansas

98-404 Karl 92 (check)

- Very strong dough
- crumb grain=sl. dense; cell shape = sl. elongated; color=white
- strong mixing flour, irregular streaky grain; good volumes, creamy crumb color
- Long mix time
- 13 ppm AA
- Slightly weak crumb texture
- MOISTURE 13.43 ASH(14%) 0.489 PROTEIN(14%) 12.21
- Bake mix time may be too long
- Best of show in quality, but low absorption; cell thickness=thin=desirable
- Slight Shell Top, Break Little Rough, Slightly Dry
- v. long mixt; hi abs.; v. nice grain; elastic dough; v. hi volume; crumb texture=good; crumb grain=closed
- Would be a good flour to blend with weaker flours.

98-405 Larned

- Dead dough
- crumb grain=sl. dense; cell shape = sl. elongated
- strong flour, open, irregular grain, low volumes, creamy crumb color
- Good absorption and crumb grain
- 75 ppm AA; oxidation; mix time; volume
- Slightly weak crumb texture
- MOISTURE 13.29 ASH(14%) 0.461 PROTEIN(14%) 12.07
- sl. short mixt; avg. abs.; poor grain; yellow; weak dough; good volume; at makeup=weak

98-406 KS95H167-3

- dead dough, lower absorption, good internals
- crumb grain=sl. dense; cell shape = sl. elongated
- good mixing strength, open grain, slightly low to average volumes.
- Good absorption, loaf vol. and crumb grain
- 38 ppm AA
- Strong and extensible dough out of the mixer
- MOISTURE 13.02 ASH(14%) 0.483 PROTEIN(14%) 11.64
- Very good loaf volume for its flour protein content. Very good crumb grain.
- out of mixer=sl. tough; cell thickness=thin=desirable
- Nice Break, Little Dry
- avg. mixt; avg. abs.; sl. open grain; yellow; elastic dough; good volume.

COOPERATOR'S COMMENTS (con't.)
(Small Scale) Kansas

98-407 KS95HW62-6

- crumb grain=sl. dense; cell shape = sl. elongated; color=white
- strong mixing flour, open grain, average volume
- Good absorption, loaf vol. and crumb grain
- 38 ppm AA
- Slightly weak crumb texture
- MOISTURE 13.85 ASH(14%) 0.458 PROTEIN(14%) 11.97
- out of mixer = very tough
- Break Slightly Rough, Little Dry
- avg. mixt; hi abs.; avg. grain; silky texture; nice dough; avg. volume.

98-408 KS96HW94

- slight core, very strong dough, good internals
- tough, bucky
- out of mixer=tough/old
- very strong mixing flour, open irregular grain, low volume
- Long mix time- messy dough while mixing- otherwise good
- 0 ppm AA; mix time
- MOISTURE 13.42 ASH(14%) 0.430 PROTEIN(14%) 12.13
- Crumb grain somewhat questionable, mix time too long.
- Too long of mix times; cell thickness=thin=desirable
- Good Break, Dry; Long time for mix pickup added .5 min
- v. long mixt; hi abs.; nice grain; tough sponge; elastic dough; low volume.
- Sides of loaf were a little concave.

98-409 KS96HW115

- slightly dead dough
- crumb grain=sl. dense; cell shape = sl. elongated; color=sl. creamy
- mix strength was very good, open, irregular grain, low volumes
- Good absorption, loaf vol. and crumb grain
- 38 ppm AA
- Slightly weak crumb texture
- MOISTURE 13.15 ASH(14%) 0.419 PROTEIN(14%) 11.87
- Very good loaf volume and crumb grain.
- out of mixer=sl. tough; Very low absorption
- Nice Break, Little Dry
- avg. mixt; avg. abs.; nice grain; nice dough; avg. volume; crumb grain=closed

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COOPERATOR'S COMMENTS (con't.)
(Small Scale) Kansas

98-410 KS84063-2W

- excellent but very strong dough
- color=white
- Extremely strong flour, open, irregular grain, above average volume
- Excellent exterior and interior crumb, white, silky
- 38 ppm AA; crumb grain
- MOISTURE 13.60 ASH(14%) 0.460 PROTEIN(14%) 14.00
- out of mixer= sl. tough; Poor texture and color
- Nice Break, Large Volume, No Shell Top at all
- sl. long mixt; hi abs.; avg. grain; silky texture; white; nice dough; hi volume.

98-411 KS85W663-42W

- excellent but very strong dough
- crumb grain=sl. dense;
- strong flour, open grain, average volumes
- Excellent exterior and interior crumb, white, silky
- 25 ppm AA
- Strong and extensible dough out of the mixer
- MOISTURE 13.76 ASH(14%) 0.436 PROTEIN(14%) 12.59
- at make-up= sl. tough; cell thickness=thin=desirable
- Nice Break
- long mixt; avg. abs.; good grain; elastic dough at makeup; good volume; crumb texture=good
- Short proof time.

Appendix B
Continued

Lakin App

WHEAT MARKETING CENTER

200200049

To: Bob Graybosch
Joe Martin
John Oades
Jim Peterson
David Shelton
Ed Souza
Don Sunderman
Glenn Weaver
Tom Willis
Vince Zortman

From: Mark Kruk and Guoquan Hou

Date: May 20,1999

Re: 1998 Crop Asian Products Collaborative (APC) Summary Report

Cc:
Colorado Wheat Commission
Idaho Wheat Commission
Nebraska Wheat Board
North Dakota Wheat Commission
Montana Wheat and Barley Committee
Oregon Wheat Commission
Washington Wheat Commission

A summary report of the 1998 crop APC is attached. This is a cooperative program between US Wheat Associates and Wheat Marketing Center. For this crop year, Malaysian Hokkien, Taiwanese Raw, and Philippine instant noodles, and Southern style Chinese steam bread were made to evaluate the quality of submitted samples.
The full report from each team is also enclosed.
We hope you can join us for a complete review of these results at the Hard White Wheat Symposia on July 22nd, at the Wheat Marketing Center.

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Comments on Wheat Acceptability of 98 Crop APC samples

Lakin KS96HW115 (WMC # 980800)-Acceptability was equal to, or slightly better than their control wheat. Low dockage and ash, and high protein and thousand kernel weight (THKW) were positive factors. A good wheat for all the teams!

Betty (WMC # 980803)-Slightly better than control for Taiwan due to high protein and low ash. Less acceptable than control for the Philippines because of low THKW and kernel diameter (KD).

N941205 (WMC # 980804)-Less acceptable than control due to high contrasting classes and wheat of other classes, high moisture, low test weight and protein too high for southern style Chinese steam bread.

Nuwest (WMC # 980805)-Equal to control for Chinese steam bread although moisture and ash were high. Slightly worse than control for Malaysians due to high moisture and ash and low THKW. Taiwan team rated acceptability worse than control because of low protein and high ash.

Sunstar II (WMC # 980806)-Philippine team rated acceptability slightly above average due to high protein. The Taiwan team rated it better than the control because of the high protein and test weight. An excellent wheat for these two teams!

OR870453 (WMC # 980809)-All three teams that evaluated this sample rated it slightly less acceptable than control. Low test weight and protein, and high contrasting classes and shrunken and broken kernels were the main deficiencies.

Platte (WMC # 980810)-Ranged from equal to control to nearly worse than control. Negatives were high dockage and contrasting classes. Steam bread makers thought the protein was too high. The Taiwan team liked the high test weight.

ID509 (WMC # 980812)-One of the highest scoring wheat samples. High flour yield and protein, and large kernels, and low moisture impressed the teams. An excellent performance!

ID377S (WMC # 980814)-This sample performed near the control, ranging from slightly better to slightly worse. Negatives were high defects and low (387s?) falling number. The sample had protein too high (China) and too low (Taiwan).

ID377S (WMC # 980816)-This sample also had a split review. The Philippine team loved the high protein, while the Taiwan team thought the low test weight and high ash were less acceptable.

ID377S (WMC # 980819)-One of the best wheat samples in the test! Both the Taiwan and Philippine team liked the high protein. Shrunken and broken kernels and defects were the highest of any US samples, but the team ratings did not reflect this.

Arapahoe (WMC # 980820)-Rated slightly less acceptable than control. Noodle teams felt the protein was too low, and the steam bread team thought the protein was too high.

Culver (WMC # 980821)-Very similar to Arapahoe, except the Taiwan team rated the sample worse than control, compared with slightly worse than control for Arapahoe.

Platte (WMC # 980825)-Philippine team rated this sample equal to control because it had high protein. The Taiwan team rated it worse than control, due to low test weight and high contrasting classes.

1999 ASIAN PRODUCTS COLLABORATIVE STUDY RESULTS SUMMARY

ACCEPTABILITY RATINGS -- WHEAT

Variety	Lab Number	Malaysia		Philippines		Taiwan		China*	
		Score	Reasons	Score	Reasons	Score	Reasons	Score	Reasons
KS96HW115	980800	3.3	low DOC.; high THKW			3	low ash	3.2	high prot.
Betty	980803			2.3	low THKW & KD	3.5	high prot., low ash		
N941205	980804	2.3	high CCL, WOCL & moist			2.5	high moist., low TW	2.4	high CCL, prot. & moist
NuWest	980805	2.3	high moist & ash; low THKW			2	low prot.; high ash	3	high ash & moist.
Sunstar II	980806			3.1	high prot.	4	high prot.; high TW		
OR870453	980809	2.8	Low prot.			2.5	high CCL; low TW	2.9	high SHBN & CCL
Platte	980810	2.3	low flr. Yld.; high Doc.	2.6	high DOC; low flr. Yld.	3	high TW	2.9	high prot. & CCL
ID509	980812	3.7	high KD & flr. Yld; low moist.	3.5	low moist.; high flr. Yld	3	high prot.		
ID377S	980814	2.8	high DEF; low FN	3.1	high DEF; low FN	2.5	low prot.	2.7	high DOC & prot.
ID377S	980816			3.8	high prot.	2.5	high ash, low TW		
ID377S	980819			3.5	high prot.	3	prot. & TW ok		
Arapohoe	980820			2.3	low prot.	2.5	low prot. & TW	2.7	high prot.
Culver	980821			2.8	low prot.	2	low prot. & TW	3.1	high prot. & WOCL
DNS/NS	980824					3	prot. & TW ok		
Platte	980825			3.1	high prot.	2	high CCL; low TW		

* For making southern style steamed bread.

Abbreviations: DOC. = dockage; THKW = thousand kernel weight; CCL = contrasting classes; WOCL = wheat of other classes; moist = moisture; prot. = protein; flr. Yld. = flour yield; DEF = total defects; FN = falling number; KD = kernel diameter; TW = test weight; SHBN = shrunken and broken kernel.

Scoring criteria:

5 -- much better than the control.
4 -- better than the control.
3 -- equal to the control.
2 -- worse than the control.
1 -- much worse than the control.

Comments on Flour Acceptability of 98 Crop APC samples

Lakin

KS96HW115 (WMC # 980800) was viewed as having desirable low ash content by Malaysia and Taiwan teams. Flour color was good. Taiwan team also liked it having high farinograph water absorption. But its gluten was considered too strong for southern style Chinese steamed bread flour.

Betty (WMC # 980803) was rated 2.8 by the Philippine team. It was liked by the Taiwan team for its low ash and high water absorption.

N941205 (WMC # 980804) was indicated to have too high ash content by each team. Taiwan team disliked it (score 2) because of low protein content and water absorption. China team felt that it had too high protein and too strong gluten for southern style steamed bread.

NuWest (WMC # 980805) was acceptable by Malaysia team. The Taiwan team scored it 2 due to low protein, low water absorption and weak gluten. But protein content was slightly high for Chinese steamed bread flour.

Sunstar II (WMC # 980806) was liked by the Philippine and Taiwan teams for its high protein content. But Taiwan team also indicated that its gluten strength was weak.

OR870453 (WMC # 980809) was rated 2.5 due to high damaged starch level and low flour L* value. Taiwan team rated it a score of 2 for high ash, low protein and high starch damage. China team scored it 3.1, but thought its ash content was high.

Platte (WMC # 980810) was rated with similar scores (2.8-3) by Malaysia, Philippine and Taiwan teams. Taiwan team commented that its ash content was high. China team rated it 2.2, citing that it had too high protein, strong gluten and high ash.

ID 509 (WMC # 980812) was rated 2.8 by Malaysia team. The Philippine team liked it because it had high protein content. Taiwan team indicated that it had high water absorption and low ash, which are positive, but it had low flour L* value, meaning darker color.

ID 377S (wheat protein 11.9%, WMC # 980814) was rated 2.3 by Malaysia team for high ash and moisture. Philippine team rated it similar to the control. Taiwan team gave a score of 2 due to high ash and low water absorption. China scored it 2.7, citing high ash and too long stability time.

ID 377S (wheat protein 13.8%, WMC # 980816) was given a score of 3.9, well liked by Philippine team for its high protein content. Taiwan team thought it was similar to the control, especially its high protein. But they claimed that its ash was high and water absorption was low.

ID377S (wheat protein 13.0%, WMC# 980819) had high protein, and so was rated better than control by the Philippine team. The Taiwan team rated it worse than control due to high ash and low absorption.

Arapahoe (WMC# 980820) performed near the control. The Taiwan team noted the low ash, damaged starch, and absorption (farinograph), and the China team pointed out the low L* value.

Culver (WMC# 980821) was rated quite differently, depending on the team. The Philippine team rated it equal to the control. The Taiwan team felt it was worse than the control, due to low protein and weak gluten. The China team rated it better than the control, but noted the high moisture.

Platte (WMC# 980825) was rated equal to the control. Protein, farinograph absorption, and damaged starch levels were judged to be OK.

1999 ASIAN PRODUCTS COLLABORATIVE STUDY RESULTS SUMMARY

ACCEPTABILITY RATINGS -- FLOUR

Variety	Lab Number	Malaysia (Straight-Grade)		Philippines (Straight-Grade)		Taiwan (60% Patent)		China* (Straight-Grade)	
		Score	Reasons	Score	Reasons	Score	Reasons	Score	Reasons
KS96HW115	980800	3.4	low ash; flr. L* high			3	low ash, high abs.	2.9	too strg gluten
Betty	980803			2.8		3.5	low ash, high abs.		
N941205	980804	2.7	high ash; low wet glut.			2	high ash; low prot. & abs.	2.5	too high prot & strg glut.; high ash
NuWest	980805	3				2	low prot. & abs; weak glut.	3.4	high prot.
Sunstar II	980806			3.1	high prot.	3	high prot. & abs; weak glut.		
OR870453	980809	2.5	high DS; low flr. L*			2	high ash; low prot.; high DS	3.1	high ash
Platte	980810	2.9		2.8		3	high ash	2.2	too high prot & strg glut.; high ash
ID509	980812	2.8		3.5	high prot.	2.5	high abs; low ash; high flr. L*		
ID377S	980814	2.3	high ash & moist.	3.3		2	high ash; low abs.	2.7	high ash; long stability time
ID377S	980816			3.9	high prot.	3	high prot. & ash; low abs.		
ID377S	980819			3.6	high prot.	2	high ash; low abs.		
Arapohoe	980820			2.9		2.5	low ash & DS & abs.	3.1	low flr. L*
Culver	980821			2.8		2	low prot; weak glut.	3.6	but high flr. moist.
DNS/NS	980824					3.5	high prot. & abs.; low ash		
Platte	980825			3.1		3	abs., prot. & DS ok		

* For making southern style steamed bread.

Abbreviations: flr. = flour; wet glut. = wet gluten; DS = damaged starch; prot. = protein; abs. = farinograph water absorption; strg glut. = strong gluten.

Scoring criteria:

5 -- much better than the control.
4 -- better than the control.
3 -- equal to the control.
2 -- worse than the control.
1 -- much worse than the control.

Comments on Product Acceptability of 98 Crop APC samples

Lakin
KS96HW115 (WMC # 980800) was tested for hokkien noodle, Chinese raw noodle and southern style Chinese steamed bread. It was rated 3.8 in hokkien noodle making because of good color and texture. This was the highest score among seven samples tested. Chinese raw noodle score was rated 3.5, slightly better than the control noodle. Good noodle color was cited as a major characteristic. But the steamed bread was blistering on the skin, which was not desirable. This problem may be due to too strong dough.

Betty (WMC # 980803) was tested for fried instant noodle and Chinese raw noodle. The fried instant noodle was scored 2.4, worse than the control because of soft texture. It was rated 3 for Chinese raw noodle making due to good noodle color. However, the bite was indicated slightly soft.

N941205 (WMC # 980804) was tested for hokkien noodle, Chinese raw noodle and southern style steamed bread. The hokkien noodle was scored 2.8 due to slightly dull noodle color. Chinese raw noodle was rated 2 because noodle color was dark. The team rated steamed bread 1.3, a very low score. It was noticed that steamed breads had problems of shrinking, blistering and dark color.

NuWest (WMC # 980805) was tested for hokkien noodle, Chinese raw noodle and southern style steamed bread. It was rated 3.4 for hokkien noodle because of good color and texture. But it did not perform well in Chinese raw noodle (score 2.5) due to poor bite. The steamed bread score was 2.4 because its surface was blistered.

Sunstar II (WMC # 980806) was rated 3.1 for fried instant noodle making and 4 for Chinese raw noodle making. The quality of instant noodle was equivalent to the control, but Chinese raw noodle quality was better. Both color and texture of Chinese raw noodles were considered better than the control noodle.

OR870453 (WMC # 980809) had similar quality scores (2.5-2.7) for hokkien noodle, Chinese raw noodle and southern steamed bread making. Poor color was cited by each team as a key factor driving the rating scores down.

Platte (WMC # 980810) was rated higher (scores 3.4-3.7) than the control in hokkien noodle, fried instant noodle and Chinese raw noodle. The teams credited it with good noodle color and texture. However, the steamed bread score was 2.6 due to dull skin color and blistering.

ID 509 (WMC # 980812) was rated 2.3 in hokkien noodle, 3.4 in fried instant noodle, and 1.5 in Chinese raw noodle. Poor noodle color was cited as a major defect in hokkien noodle and Chinese raw noodle.

1999 ASIAN PRODUCTS COLLABORATIVE STUDY RESULTS SUMMARY

ACCEPTABILITY RATINGS -- NOODLE OR STEAMED BREAD

Variety	Lab Number	Malaysia Hokkien Noodle Score	Malaysia Hokkien Noodle Reasons	Philippines Fried Instant Noodle Score	Philippines Fried Instant Noodle Reasons	Taiwan Chinese Raw Noodle Score	Taiwan Chinese Raw Noodle Reasons	China* Southern Steamed Bread Score	China* Southern Steamed Bread Reasons
KS96HW115	980800	3.8	gd color & texture			3.5	gd color	2.9	skin bubbling
Betty	980803			2.4	soft texture	3	gd color, slightly soft bite		
N941205	980804	2.8	slightly dull color			2	pr color	1.3	shrinking, bubbling, dark color
NuWest	980805	3.4	gd color & texture			2.5	pr bite, ok color	2.4	bubbling
Sunstar II	980806			3.1		4	gd color & bite		
OR870453	980809	2.6	slightly dull appearance			2.5	gd color, pr bite	2.7	pr color, shrinking
Platte	980810	3.7	gd color & texture	3.4		3.5	gd color & bite	2.6	dull color, bubbling
ID509	980812	2.3	pr color, gd texture	3.4		1.5	very pr color, ok bite		
ID377S	980814	2.9	slightly pr color	3.4		2.5	slightly pr color & bite	2.9	bubbling
ID377S	980816			4		3	pr processing		
ID377S	980819			4.2		2.5	pr color & processing		
Arapohoe	980820			3.2		2.5	pr color	2.4	pr color, shrinking
Culver	980821			3.4		2.5	pr color & processing	2.6	pr color
DNS/NS	980824					3	gd color & bite		
Platte	980825			3.4		3	gd color & bite		

* For making southern style steamed bread.
Abbreviations: gd = good; pr = poor.

Scoring criteria:

5 -- much better than the control.
4 -- better than the control.
3 -- equal to the control.
2 -- worse than the control.
1 -- much worse than the control.

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EXHIBIT E
STATEMENT OF THE BASIS OF OWNERSHIP

The following statements are made in accordance with the Privacy Act of 1974 (5 U.S.C. 552a) and the Paperwork Reduction Act (PRA) of 1995.

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

1. NAME OF APPLICANT(S)	2. TEMPORARY DESIGNATION OR EXPERIMENTAL NUMBER	3. VARIETY NAME
Kansas Agricultural Experiment Station	KS96HW115	Lakin

4. ADDRESS *(Street and No., or R.F.D. No., City, State, and ZIP, and Country)*	5. TELEPHONE *(include area code)*	6. FAX *(include area code)*
Waters Hall Kansas State University Manhattan, KS 66506	785-532-6147	785-532-6563

7. PVPO NUMBER 20020049

8. Does the applicant own all rights to the variety? *Mark an "X" in appropriate block.* If no, please explain. [X] YES [ ] NO

9. Is the applicant (individual or company) a U.S. national or U.S. based company? [X] YES [ ] NO
If no, give name of country

10. Is the applicant the original owner? [X] YES [ ] NO *If no, please answer one of the following:*

a. If original rights to variety were owned by individual(s), is (are) the original owner(s) a U.S. national(s)?

[ ] YES [ ] NO **If no, give name of country**

b. If original rights to variety were owned by a company(ies), is(are) the original owner(s) a U.S. based company?

[ ] YES [ ] NO **If no, give name of country**

11. Additional explanation on ownership *(if needed, use reverse for extra space)*:

PLEASE NOTE:

Plant variety protection can be afforded only to owners (not licensees) who meet one of the following criteria:

1. If the rights to the variety are owned by the original breeder, that person must be a U.S. national, national of a UPOV member country, or national of a country which affords similar protection to nationals of the U.S. for the same genus and species.

2. If the rights to the variety are owned by the company which employed the original breeder(s), the company must be U.S. based, owned by nationals of a UPOV member country, or owned by nationals of a country which affords similar protection to nationals of the U.S. for the same genus and species.

3. If the applicant is an owner who is not the original owner, both the original owner and the applicant must meet one of the above criteria.

The original breeder/owner may be the individual or company who directed final breeding. See Section 41(a)(2) of the Plant Variety Protection Act for definition.